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UNIVERSITY OF TORONTO

REPORT OF THE DEAN

OF THE

FACULTY OF MEDICINE

Session 1968-1969

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Report of the Dean of the Faculty of Medicine

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THE DEAN OF THE FACULTY OF MEDICINE

The past year has been one of great activity in many areas. Some of the more important are still under study.

The most pressing problem has been the need to determine the amount of space required by the University in the teaching hospitals. Government has required that both the total needs and the individual needs of each hospital be clearly stated and justified before construction proceeds in any one. Because five hospitals, the Toronto General, the Toronto Western, New Mount Sinai, St. Michael's, and Sunnybrook, are all seeking approval for major expansion the pressure for an answer from the University is very great. Accordingly, a special committee of the Board of Governors to which were added six members of the senior medical staff was convened. This Committee first affirmed continuation of the University's affiliation with the group of hospitals at present recognized as teaching hospitals. It then requested the Department Heads of the Clinical Services to set out their requirements. Lengthy meetings throughout the summer of 1968 resulted in a report which was rejected when presented in September to the Senior Co-Ordinating Committee (Deputy Minister of Health, Deputy Minister of University Affairs, and Chairman of the Ontario Hospital Services Commission), because the requirements for new staff and for offices and research laboratories of full-time and major part-time staff were not specific enough.

The report had major repercussions within the hospitals and among their professional staffs because of priorities ascribed by the Board of Governors' Committee to the various building programmes. In addition a suggestion was made that provision of major teaching and research facilities in the hospitals would require more detailed agreements between them and the University than those at present in existence.

Following a number of special meetings of the Faculty Council permission was granted for a special delegation consisting of representatives from all the teaching hospitals to meet with the Senior Co-Ordinating Committee. The delegation was informed that the number of patient beds to be allocated to each hospital had been fixed and that the numbers of postgraduate students (Interns, Residents, etc.) would be limited to between eight hundred and a thousand. The University was asked to review its requests in the light of these figures and indicate clearly the space requirements in each hospital for the number of teaching beds; offices for full- and major part-time staff; research laboratories for Clinical and Basic Sciences; and undergraduate facilities, lecture rooms, seminar rooms, library facilities, etc.). This necessitated a degree of co-operative planning between the University and the hospitals which had never occurred before.

The Faculty Council, on the Dean's recommendation, requested that an "independent committee" composed of Heads of Departments, and representatives of the professional staff, Executive Directors, and Boards of Trustees of all the teaching hospitals meet to co-ordinate planning and send a report to the Senior Co-Ordinating Committee. Each group of representatives would make independent reports to its sponsoring body. There was general acceptance by those concerned. Senator W. McCutcheon agreed to act as Chairman, with Mr. Davies of Davies, Ward & Beck as his assistant; unfortunately Senator McCutcheon died before the Committee started its work, but Mr. Davies agreed to assume the role of Chairman. For the past six months the Heads of Departments have met weekly, and on occasion twice a week, for an average of four or five hours per session. Under Mr. Davies' able direction they have re-examined their needs and confirmed these with the staff and administration of the hospitals concerned. Completion of the report is hoped for by the summer of 1969. It would be unwise to prejudge its recommendations but preliminary findings indicate that major renovations and extensive development of

research facilities in many of our major teaching hospitals are required if we are to maintain the standard of this medical school.

One outcome of this requirement for extensive co-ordination and co-operation in planning has been the recognition by the Faculty that its administrative machinery is also inappropriate to its needs. Special committees of the Heads of Departments and of the Faculty have been studying the methods by which decisions are reached in the Faculty and the methods of implementing them. Special meetings of the Faculty have been called to discuss the recommendations of these committees.

A major difficulty is to clearly delineate the educational component from the service and professional requirements of the staff working in these big community hospitals. Since a large number of the Faculty are part-time teachers the last two are naturally of great importance to them.

While these activities have consumed an enormous amount of the time of staff at all levels, planning and implementation of the new curriculum have been equally demanding. The Systems Committees have spent many hours filling in the details of the broad policies originally developed. The Clinical Clerkship (Period III or Fourth Year) got under way on June 9 and will run until mid-April next year. Since most of the Medical Schools in the Province have adopted this plan, government has agreed to subsidize final year students for the loss of summer time earnings. Period Ia will commence in September and Period IIa will commence in January 1970.

The adoption of a new curriculum for the first two years in Arts and Science has led to the abolition of the Premedical Course. Students applying to enter First Year Medicine must have either a degree from a recognized university or two years at the University of Toronto in which they have completed stipulated courses in Chemistry, Physics, and Zoology as part of a programme of their own choosing within the Arts Faculty. At this date it also seems apparent that formal programmes such as Biological and Medical Science will come to an end when those at present enrolled complete their course.

Three new departments have been recommended by Faculty Council and approved by the Senate: a Department of Family and Community Medicine; a Department of Medical Cell Biology; and a Department of Preventive Medicine. The desirability of setting up a Department of Family Medicine has been under review for over two years. It is expected that the new department will encourage larger numbers of students to accept the challenge of this type of medical practice. The Department of Preventive Medicine returns to the Faculty after a lengthy sojourn in the School of Hygiene. The new department will have joint appointments from both schools, with the head of the department residing in the Faculty of Medicine. Cell Biology is an off-shoot of the Department of Medical Biophysics. It will combine certain aspects of the fields of microbiology, immunology, and genetics.

It is with regret that I announce the retirement of Dr. Ian Macdonald as Associate Dean and Head of the Division of Postgraduate Medical Education. Dr. Macdonald started this programme and has built it into a remarkably efficient unit over the years. The courses in continuing education sponsored by this department have done much to maintain the clinical competence of the physicians in practice. He will be succeeded in this post by Dr. K. J. R. Wightman, the Professor of Medicine. Professor Wightman brings a wealth of clinical experience to this post but leaves a gap as Chairman and Head of the Department of Medicine which will be hard to fill.

Professor Bain of the Department of Paediatrics has undertaken, with the co-operation of both the provincial and federal governments, to provide medical care for a large area of Northern Ontario with its centre in Sioux Lookout. This is primarily to provide services to the Indian and Eskimo population in these dispersed areas. It will also help the residents from the participating departments to learn some of the problems of medicine not seen in our city hospitals.

The new Medical Sciences Building is nearing completion and is expected to be available for full occupancy by September when the new term begins. It is truly a

magnificent structure and provides an unexcelled facility for the study of medical science. Budgetary restrictions have dampened the initial enthusiasm somewhat but we anticipate these will be relaxed in the not too distant future.

Student participation in faculty activities by both undergraduates and post-graduates has gained momentum. It has been both provocative and stimulating and I am sure will add greatly to our deliberations. We have been fortunate that Professor J. Thompson of the Department of Anatomy has been made a member of the Commission on University Government. The old order is changing and giving way to the new; it is not the change but rather its pace which presents the greatest challenge.

The contribution to various fields of medicine by members of our staff has been recognized by the honours received:

Dr. R. I. Macdonald—Ll.D. (Honoris causa) Dalhousie University.

Dr. K. J. R. Wightman—Visiting Professor, Memorial University, St. John's, Newfoundland; Visiting Professor, Union Memorial Hospital, Baltimore.

Professor R. A. Gordon—The Gold Medal of the Canadian Anaesthetists' Society for Distinguished Service in Anaesthesia.

Professor H. E. Johns—Canada Centennial Medal (1967).

Professor L. Siminovitch—Canada Centennial Medal (1967).

Dr. G. Dohlman—Barany Medal at Uppsala, Sweden, for distinguished research contributions on the cellular physiology of the organ of balance.

Dr. J. Bain—Awarded the Society Award of the Canadian Society of Obstetricians and Gynaecologists.

Dr. A. Rapoport—The William Goldie Prize in 1968.

Dr. W. H. E. Roschlau—The Honors Achievement Award from the Angiology Research Foundation, New York, U.S.A., in recognition of distinguished contributions and significant accomplishments in the support of research and study of angiology.

Dr. P. D. Cooper—Government of France Visiting Scientist, April–May 1968.

Dr. P. A. Christie—Canada Centennial Medal.

Dr. C. B. Farrar (Professor Emeritus, Dept. of Psychiatry)—His Excellency, The Rt. Hon. Roland M. Michener, Governor General and Chancellor of the Order of Canada, held a private investiture on May 5, 1969, in Dr. Farrar's home, and presented Dr. Farrar with the Medal of Service of the Order of Canada.

Dr. M. V. Jackson—Life Fellow, Academy of Medicine, Toronto.

Dr. A. L. Jones—Fellow, Royal College of Physicians of Ireland.

Dr. J. W. Lovett-Doust—Fellow, Royal College of Physicians and Surgeons (London).

Dr. A. T. Jousse—The Medal of Service of the Order of Canada. Investiture October 28, 1969.

Dr. W. R. Drucker—Centennial Professor, Prince Henry's Hospital, Monash University, Melbourne, Australia.

Dr. R. J. Baird—Medal in Surgery, Royal College of Physicians and Surgeons of Canada.

Dr. W. P. Bobechko—George Armstrong Peters Prize in Surgery, 1968.

Finally, I should like to thank the many benefactors of the Faculty for their continued support, particularly that of the Medical alumni who continue to be most generous to our scholarship, bursary, and student training programme.

Research

Abbot Laboratories Limited; Alcoholism and Drug Addiction Foundation; American Heart Association; American Medical Association; Astra Pharmaceuticals of Canada; The Atkinson Charitable Foundation; E. A. Attridge; Ayerst Laboratories; Banting Research Foundation; Beck Charitable Foundation; Charles H. Best Foundation; J. P. Bickell Foundation; J. W. Bills Estate; Bongard, Leslie and Company Limited; Stella Buckham Fund; N. B. Brennan Estate; Canadian Arthritis and Rheumatism Society; Canadian Diabetic Association; Canadian Foundation for

Advancement of Therapeutics; Canadian Heart Foundation; Canadian Life Insurance Association; Canada Permanent Trust; Athol Cherry Estate; J. Clemens Estate; Cleveland Diabetic Fund; The Commonwealth Fund; Charlie Conacher Fund; The Connaught Medical Research Laboratories; J. M. Connell; The James H. Cummings Foundation; Deafness Research Foundation; The Defence Research Board; Denison Mines; Department of Health (Provincial); Department of National Health and Welfare; Donner Canadian Foundation; Eaton Endowment Account; G. Farrow; T. Foster Estate; Carey Fox Foundation; J. Fox Estate; P. R. Gardiner Foundation; F. C. Gray Estate; Hartford Foundation New York; Hoechst Pharmaceuticals; Lisa Horne Estate; G. l'Anson Estate; I. G. Ingle; Insulin Trust Fund; M. B. Kerbel Ophth. Foundation; Leitch Transport; Elli Lilly; R. Samuel McLaughlin Foundation; McNeill Laboratories Canada Limited; John and Mary Markle Foundation; Medical Research Council of Canada; T. J Meek Estate; Multiple Sclerosis Society; Muscular Dystrophy Association of Canada; National Aeronautics and Space Administration (USA); National Cancer Institute; National Research Council of Canada; National Health and Welfare Fitness and Amateur Sport; Ontario Cancer Treatment and Research Foundation; Ontario Geriatric Society; Ontario Heart Foundation; Ontario Hospital Services Commission (Eye Bank); Ontario Mental Health Association; Ontario Tuberculosis Association (Ontario Thoracic Society); Leon Pape; H. D. Phelan; Playfair Foundation; Rehabilitation Fund for the Disabled; Eliza J. Robertson Estate; Stephen B. Roman Foundation; B. E. Roney Estate; The Selkirk Fund; I. E. Smythe Fund; Stapells Fund; M. Treneman Estate; United States National Institutes of Health; Upjohn Company; Mona Willinsky Memorial Fund; Workmen's Compensation Board.

Visitors

During the academic session many prominent physicians and scientists visited the Faculty. These included:

Department of Anaesthesia: Professor Philip Bromage, McGill University, who gave the Tenth Dr. Harry Shields Lecture; Professor Charles Pittinger, Vanderbilt University; Professor Sir Robert Macintosh of Oxford; Professor Richard Kelman, University of Aberdeen; Dr. Brian Dwyer, Sydney; Dr. Salard Tupavong, Siriraj Medical School, Bangkok; Dr. John P. Ritchie, Dunedin; Dr. Mary Burnell, Adelaide; Dr. Carlos Parsloe, São Paulo, Brazil; Dr. Herbert H. Pinkerton, Glasgow; Professor J. Payne, Royal College of Surgeons of England.

Department of Art as Applied to Medicine: Miss Adele Spiegler, New York.

Banting and Best Department of Medical Research: Dr. P. B. Garland, University of Bristol; Dr. K. S. Krooth, University of Michigan; Dr. R. H. Davis, University of Michigan; Dr. B. P. Schimmer, Brandeis University; Dr. F. J. Ballard, Fels Research Institute, Temple University; Dr. C. A. Price, Department of Plant Biology, Rutgers State University; Dr. Charles Clarke, National Institute of Health; Dr. P. D. Papahadjopoulos, State University of New York, Buffalo; Dr. B. Shapiro, Rockefeller University; Dr. E. Goldwasser, University of Chicago; Dr. A. C. Stam, Harvard University Medical School; Dr. J. Urquhart, University of Pittsburgh; Dr. G. Schatz, Cornell University; Dr. H. Nolls, Northwestern University; Dr. J. M. Felts, University of California, San Francisco; Dr. W. Gevers, Rockefeller University; Dr. R. W. Hanson, Fels Research Institute, Temple University; Dr. M. Rodbell, National Institute of Health; Dr. H. Rosenberg, John Curtin School of Medical Research, Australian National University; Dr. E. A. Evans, Radiochemical Centre, Amersham, England; Dr. R. A. Cook, University of California, Berkeley; Dr. T. G. Cooper, Purdue University; Dr. J. J. Blum, Duke University Medical Center, Durham, NC; Dr. N. Gentner, Stanford University Medical Center; Dr. R. E. Beyer, University of Michigan; Dr. Hans-Peter Bär, Institute for Biomedical Research, Chicago.

Behavioural Science Unit: Dr. Robert Slater, Director, Association for Aid of Crippled Children, New York; Professor Jack Elinson, Director, Division of Sociomedical Sciences, School of Public Health, Columbia University; Professor Edward A. Suchman, Department of Sociology, University of Pittsburgh; Dr. Morley Elliott, former Deputy Minister of Health, Province of Manitoba; Dr. J. Wendell Macleod, Executive Secretary, Association of Canadian Medical Colleges, Ottawa; Helan K. Mussallem, PH.D., Director, Canadian Nurses' Association, Ottawa; Jean Leask, R.N., Director, Victorian Order of Nurses, Ottawa; Dr. Richard Olmstead, Professor of Paediatrics, University of Oregon; Dr. Henry Kedward, Professor of Preventive and Social Medicine, Memorial University; Dr. F. Ian Gilchrist, Medical Health Officer, Ontario Department of Health, Moose Factory; Dr. Kenneth I. G. Benson, Director, Department of Health Services and Hospital Insurance, British Columbia; Dr. John Hamilton, McMaster University; Hans J. Kieferle, M.A., Research Associate, Association of Canadian Medical Colleges, Ottawa; Michael E. Palko, M.A., Director, Health Education, National Department of Health and Welfare, Ottawa; Dr. D. Griffin McKerracher, Department of Psychiatry, University of Saskatchewan; Dr. Edward Tulchinsky, Medical Director, Community Group Health Centre, St. Catharines; Professor J. Ivan Williams, Department of Sociology, University of Western Ontario; Dr. John Owen, Department of Preventive Medicine, University of Saskatchewan; Professor Hester J. Kernan, School of Nursing, University of Saskatchewan; Dr. Harold W. Kearnes, Department of Community Medicine, University of Kansas; Professor Richard Osborne, Department of Sociology, University of Western Ontario; Professor L. G. Marston, Department of Psychology, University of Guelph; Dr. Robert Spasoff, Saskatoon Community Clinic, Saskatoon; Dr. Samuel Wolfe, Professor of Community Medicine, Meharry Medical College, Nashville, Tennessee; Professor Sally M. Weaver, Department of Anthropology, University of Waterloo; Professor Donald L. Mills, Department of Sociology, University of Calgary; Professor Donald E. Larson, Department of Sociology, University of Alberta; Dr. David G. Fish, Research Director, Association of Canadian Medical Colleges, Ottawa; Professor Mary Hendrickson, Department of Sociology, University of Alberta.

Department of Medicine: Dr. C. S. Brown, Baltimore; Dr. D. H. Cameron, Dryden, Ontario; Dr. W. B. Castle, Boston; Dr. P. A. Chervenick, New Brunswick, New Jersey; Dr. K. Clarke, St. Thomas, Ontario; Dr. J. Cooper, Buffalo, New York; Dr. J. V. Dacie, London; Dr. V. DeVita, Bethesda, Maryland; Dr. F. Dixon, La Jolla, California; Dr. P. Fessas, Athens; Dr. E. R. Giblett, Seattle; Dr. G. Goldenberg, Winnipeg; Dr. J. L. Gowans, Oxford; Dr. R. Gramiak, Rochester, New York; Dr. M. Gueron, Beer-Sheva, Israel; Dr. D. Henderson, Boston; Dr. R. Hertz, Bethesda, Maryland; Drs. Kurt and Rochelle Hirschorn, New York; Dr. G. Hitchings, Tuckahoe, New York; Dr. J. Holland, Buffalo; Dr. Z. Laron, Tel Aviv; Dr. T. Lockwood, Cooksville, Ontario; Dr. A. J. Longmore, Kitchener, Ontario; Dr. G. Mathé, Paris; Dr. D. Milne, Kincardine, Ontario; Dr. P. L. Mollison, London; Dr. R. Naylor, Edmonton; Dr. J. Paige, Brockville, Ontario; Dr. I. Plenderleith, Vancouver; Dr. B. Sanders, Welland, Ontario; Dr. P. Shab, Rochester, New York; Dr. P. Sonksen, Boston; Dr. H. Swan, Barrie, Ontario; Dr. K. Thurau, Munich; Dr. D. A. Wadell, Calgary; Dr. M. Waxman, Durham, North Carolina; Dr. A. Westerlund, Stockholm; Dr. I. Woolfrey, Botwood, Newfoundland; Dr. D. Wright, London.

Department of Ophthalmology: The Eleventh Walter Wright Lecture was given by Dr. Barrie R. Jones, Institute of Ophthalmology, London; Mr. John Winstanley, St. Thomas' Hospital, London; Professor Frank B. Walsh, Baltimore; Dr. W. F. Hoyt, San Francisco; Dr. T. P. Kearns, Mayo Clinic, Rochester; Dr. John Locke, McGill University; Dr. T. S. Leeson, Professor and Chairman, Department

of Anatomy, University of Alberta; Dr. H. Werner, Montreal; Dr. J. G. Fowler, Buffalo; Dr. E. Shubert, London, Ontario; Dr. W. J. Hollenberg, London, Ontario; Dr. D. J. McCallion, Hamilton, Ontario; Dr. Patricia Diamond, Hamilton, Ontario.

Department of Otolaryngology: Mr. Miles Foxen, Consultant, ENT surgeon, Middlesex Hospital, London; Mr. T. Buffin, Consultant ENT surgeon, Sheffield Hospitals and Chesterfield Royal Infirmary; Dr. William McNally, Professor Emeritus, Department of Otolaryngology, McGill University; Dr. Malcolm Williams, Queen's University; Dr. Hans Engstrom, Chairman, Department of Otolaryngology, Akademiska Sjukhuset, Uppsala, Sweden; Dr. Nils Henriksson, University of Lund, Sweden; Dr. Arne Sjoberg, Akademiska Sjukhuset, Uppsala, Sweden; Dr. Malcolm Stroud, St. Louis, Missouri; Dr. Garth Hemenway, University of Colorado; Dr. Paul Fugère, Université Laval; Dr. Robert Bertrand, McGill University.

Department of Paediatrics: Dr. Kurt Hirschorn, Mt. Sinai School of Medicine, New York City; Professor J. S. Saksena, Department of Physiology, Medical College, Hubli, India; Dr. Luis G. Ibarra, Hospital Infantil de México, México; Dr. William A. Silverman, Children's Hospital, San Francisco; Dr. J. Collee, University of Edinburgh Medical School; Professor Bozzoli, South Africa; Dr. James Teele, Harvard School of Public Health, Boston; Dr. Peter Adams, Case Western Reserve University, Cleveland; Professor Goran Sterky, Karolinska Institute, Stockholm; Dr. P. R. Knight, University of Adelaide; Professor Zvi Laron, Petah Tiqva, Israel; Dr. F. Versar, University of Basel; Dr. Ruth Illig, Children's Hospital, Zürich; Dr. B. Neal, Royal Children's Hospital, Melbourne; Dr. R. McDonald, University of Cape Town; Professor R. G. Hendrickse, University of Ibadan; Dr. Bruce Chown, University of Manitoba; Professor B. L. Perey, University of Sherbrooke; Dr. J. E. Siegmiller, Bethesda, Maryland; Dr. Barbara Clayton, Hospital for Sick Children, London; Dr. John F. McCreary, University of British Columbia; Dr. M. K. Strolling, Plymouth; Dr. I. Scheinberg, Albert Einstein College of Medicine, New York City; Dr. Robin Bannerman, Buffalo; Dr. J. M. Berg, London; Dr. R. J. Haggerty, University of Rochester; Professor A. Royer, Montreal; Professor W. B. Castle, Boston; Dr. W. J. Weston, Wellington, New Zealand; Professor Charles A. Janeway, Boston; Dr. L. E. G. Sloan, Royal Children's Hospital, Victoria, Australia; Dr. W. W. Payne, Hammersmith Hospital, London; Dr. D. G. Vulliamy, Dorchester, England.

Department of Pathology: Dr. P. J. Goldblatt, University of Pittsburgh; Dr. T. B. Teoh, Hong Kong; Dr. R. O. Recknagel, Case Western Reserve University, Cleveland; Dr. T. M. Cowan, London Hospital Medical College; Professor P. Herdson, University of Auckland; Dr. E. R. Gabrieli, Buffalo; Professor R. Hudson, National Heart Hospital, London; Professor O. Bjarnson, University of Iceland; Dr. N. P. Napalkov, Institute of Oncology, Leningrad; Professor G. Forbes, University of Glasgow; Dr. G. Baroldi, Institute of Morbid Anatomy, Milan; Dr. R. Hassler, Max-Planck Institute for Brain Research, Frankfurt; Dr. I. Klatzo, National Institutes of Health, Bethesda; Dr. R. Terry, Albert Einstein College of Medicine, New York; Dr. F. K. Austin, Harvard Medical School; Dr. J. Rockey, University of Pennsylvania; Dr. E. Kabat, College of Physicians and Surgeons of Columbia, New York; Dr. Alice Johnston, Woodruff Medical Centre of Emory University; Dr. K. Bloch, Massachusetts General Hospital; Dr. K. Ishizaka, University of Colorado; Dr. E. Becker, Walter Reed Army Medical Centre; Dr. P. Henson, Scripps Clinic and Research Foundation.

Department of Pathological Chemistry: Dr. Milan Hăsek, Czechoslovak Academy of Sciences; Dr. G. W. G. Sharp, Massachusetts General Hospital; Dr. F. W. Matthews, Canadian Industries Limited, Montreal; Dr. Murray Saffran, McGill University.

Department of Physiology: Dr. W. Malaisse, University of Brussels; Dr. R. F. Mottram, University College of South Wales and Monmouthshire; Dr. J. J. Dreifuss, University of Geneva; Dr. F. M. S. Chand, McGill University; Dr. D. H. Copp, University of British Columbia; Dr. R. Nadeau, Université de Montréal; Dr. E. Monod, University of Paris; Dr. K. Thurau, University of Munich; Dr. A. Naimark, University of Manitoba; Dr. P. Sonksen, Joslin Research Laboratory, Harvard Medical School.

Department of Psychiatry: Dr. Thorsten Sjovall, Vice President of the Swedish Psychoanalytic Society and Head of the Psychiatric Service of the Mental Health Clinic, City of Stockholm; Dr. M. Laufer, member of the London Institute of Psychoanalysis; Dr. G. Morrison Carstairs, Professor, Psychological Medicine, University of Edinburgh, and President, World Federation for Mental Health; Dr. Hilliard Jason, Professor and Director of the Office of Medical Education Research and Development, Olin Memorial Health Centre, Michigan State University; Dr. Jacob Christ, Psychiatrist-in-Charge of the Outpatient Clinic, McLean Hospital, Belmont, Massachusetts; Professor Weston La Barre, Professor of Anthropology, Duke University; Dr. Harold Hillman, Reader in Physiology, Department of Biological Sciences, University of Surrey; Dr. Ralph Hirschowitz, Research Associate, Harvard Medical School; Dr. Ronald Melzack, McGill University; Dr. Marcel Lemieux, Medical Superintendent of the Hôpital-des-Laurentides, was the Hoffmann-La Roche Lecturer.

Department of Radiology: Professor D. E. S. Palmer, University of Pennsylvania; Professor Richard H. Greenspan, University of California; Dr. John Walker, Leicester; Dr. John K. Miller, Adelaide; Professor Eric N. C. Milne, Harvard University; Professor Walter E. Berdon, Columbia-Presbyterian Medical School, New York; Professor A. Lalli, University of Michigan; Dr. Berkeley Zinn, Buffalo.

A. L. Chute

DIVISION OF POSTGRADUATE MEDICAL EDUCATION

Under the direction of Professor R. Ian Macdonald

It is now generally accepted that medical schools have an inherent responsibility to make proper provision for the postgraduate phases of the life-long process of medical education. There is no general agreement about what proper provision includes; but, if objectives are clear and the varying needs of different postgraduate students are understood, individual faculties can decide what the local situation demands and what can be done about it with the resources available.

It should be kept clearly in mind that postdoctoral education in medicine has the specific purpose of deepening the understanding and extending the competence and experience of graduates in the wide variety of medical fields to which they may direct their interests. A clear distinction can be made between the different phases of postgraduate medical education.

1. Full-time graduate education in the clinical fields which, from the University point of view, may be: (*a*) non-credit programmes structured to meet the requirements of the Royal College of Physicians and Surgeons of Canada or of the College of Family Practice of Canada; (*b*) credit courses such as the diploma

programmes in Anaesthesia, Psychiatry, Radiology, and Clinical Chemistry offered by this school.
2. Full-time graduate education in basic science in preparation for careers in teaching and research in a special field or to complement education in one of the clinical sciences.
3. Continuing education programmes for graduates already in professional practice either general or specialized. This school offers both intramural and extramural programmes which are designed not only to review and revise previously acquired knowledge but also to keep the student abreast of new knowledge applicable to his particular field of work.

The Faculty Committee whose deliberations up to 1955 led to the establishment of this Division recognized the different phases in medical education and the varying objectives which had to be taken into account. They found that a great deal of postdoctoral education had been going on in this Faculty for years and that it had imposed an increasingly heavy load on the traditional primary responsibilities of undergraduate teaching and research. They had some reason to believe that there was a certain duplication of effort and they were somewhat concerned that few people, even within the University, were more than dimly aware of the numbers of "noncredit learners" who were receiving their education from medical school teachers. They predicted that demands for programmes of postgraduate medical education would inevitably increase and that universities would be bound to meet them either directly by establishing their own programmes or indirectly through providing staff assistance to programmes planned by other organizations. The Committee recommended, and the Faculty Council approved, that a Division of Postgraduate Medical Education be established to provide a permanent organization capable of contributing to the development and co-ordination of the postgraduate activities of the Faculty. Departments with well established programmes were to be given help and advice if they requested it, educational needs of graduates were to be explored, and new programmes were to be developed as needs became clearer and resources became available to meet them. The rather broad terms of reference did not include a definition of what the Committee considered "proper provision." However, by implication, programmes were not to be mounted unless they met a legitimate need; and, when offered, they were to be of the highest quality possible. A further proviso was that there should be strict economy not only in the use of University funds but also in the use of staff time. Perhaps as a wise precaution to ensure economy, a modest budget was obtained through the assignment of certain fees; and it was laid down that beyond this the Division would have to be an earning one. Through the understanding and co-operation of the Faculty, these financial constraints did not impose much impediment to orderly development of various programmes. However, with growth, it was almost inevitable that intramural continuing education programmes would come to provide the main support for other intramural programmes. The extramural (decentralized clinic) programmes had from the beginning the benefit of outside financial assistance. For the first five years the Kellogg Foundation provided the money; then several hospital medical staffs in different parts of the Province gave generous support; and more latterly the programmes have been sustained through support from the Ontario Medical Association, the Ontario Heart Foundation, the Ontario Thoracic Society, and the Ontario Cancer Treatment and Research Foundation. The point has now been reached when it seems likely that the intramural continuing education programme can no longer be expected to meet the demands of other intramural programmes for which fees can, at best, be only nominal.

The work of the Division, as in previous years, continued to increase during the past session. However, in one very significant programme the Division's responsibility ended. The special first year "mixed" residency organized by the Postgraduate Committee in 1948 as a special programme to prepare candidates for careers in general practice had proved to be successful for many years. It had provided opportunities for a number of unusually competent doctors to further their education and they

are now in prominent positions in different communities in Canada. For the past few years it has been difficult to keep this programme alive and it seemed obvious that acceptable candidates were being attracted to other programmes. There were 2,532 registrants during the session. Five hundred and six (506) of these were interns, residents, and Fellows and 1,723 were doctors in practice who registered for short intramural refresher courses in various special and general fields. There were 138 residents enrolled in diploma courses and 63 attended sessional courses. Twenty-one (21) Columbo Plan and occasional students registered for work in different departments. The advanced graduate courses in Medicine, Surgery, and Obstetrics and Gynaecology attracted 81 graduates.

The extramural (decentralized clinic) programme continued to be useful. These clinics are a co-operative effort between the Faculty of Medicine and different local medical societies. They involve a visit by a University team and the subject of the clinical presentations is decided upon by a local committee. The visiting teachers usually use the case under discussion as a text to expound newer knowledge and to review the old. During the year 17 clinics were held in 10 centres and 33 University teachers participated. Clinics at the Lakehead extended over 2 days, the 5 clinics at Kirkland Lake involved morning and afternoon sessions, and about half of the remaining clinics were half-day affairs.

Previous annual reports have referred to the usefulness of these clinics not only for the local doctors receiving the visitors but for the University visitors themselves. It can be said to be an extremely valuable public relations effort as well as an efficient means of providing continuing medical education.

At the end of this session the writer of this report will relinquish the Directorship of the Division and will be succeeded by Professor K. J. R. Wightman. He will face some challenges and no doubt necessary changes in the original terms of reference of the Division, particularly in the financial arrangements, will evolve. With the aid of such an experienced and loyal staff there should be no difficulty in drawing up plans to meet increasingly expanding responsibilities. I am most grateful to them for all that has been done since 1955 and in particular I must record the efficient and dedicated service given constantly by Mrs. Flinn. From the very beginning there seems to have been a more or less constant flow of work and a need to communicate with practically every department in the Faculty and with many departments within the University. That the Division appears to enjoy cordial relations with the Faculty generally and with the central administration is almost entirely due to Mrs. Flinn's understanding of the University community and of the terms of reference under which the Division functions. I am also grateful to the other members of the staff and to Dr. Godden who has been my colleague for the past two years.

DIVISION OF REHABILITATION MEDICINE

Under the direction of Professor A. T. Jousse

The teaching programme has provided instruction for graduates and undergraduates in medicine, physical and occupational therapy, and nursing. Speech pathologists and audiologists have been educated in a two-year diploma programme.

Prosthetic and orthotic education has been offered to a few who were selected for such learning on the basis of aptitude and interest.

Members of the division in the persons of Drs. Crawford, Godfrey, Geisler, Jousse, Renaud, and Franks contributed much time, energy, and thought to the Fifth International Congress of Physical Medicine which was held at the Queen Elizabeth Hotel in Montreal, August 25–31, 1968.

The teaching staff in Physical and Occupational therapy continued to play an active role in the national and international affairs of their respective professional associations.

Dr. C. M. Godfrey spent one month in Indonesia as a Voluntary Visiting Specialist with Care-Medico of Canada.

RESEARCH

At the Wellesley Hospital under the direction of Dr. Charles Godfrey, a one-year pilot programme for the diagnosis and treatment of perceptually handicapped children: "The development of an all-purpose shoe for patients with deformed and painful feet due to rheumatoid arthritis."

At Lyndhurst Lodge Hospital under the direction of Dr. W. O. Geisler with Dr. G. Secord: "Investigation of methods of acidification of urine and the effects of urine acidification on bacterial population in the urine of patients on catheter drainage."

At the Toronto Western Hospital—J. S. Crawford, A. Wiley, J. Gardiner, H. Hamilton: "A study of the incidence of thrombo-embolic disease in the fractured hip through venography"; "A double blind study to determine the value of anticoagulants in patients with thrombo-embolic disease following hip fracture"; "Assessment of the rheumatoid hand pre- and post-operatively."

HONOURS

C. M. Godfrey: elected Chairman, Medical Advisory Board, Care-Medico of Canada; elected Chairman, History of Medicine Section, Academy of Medicine, Toronto.

Mrs. S. Irvine: elected President of the Canadian Association of Occupational Therapists in October, 1968.

A. T. Jousse: awarded the Medal of Service of the Order of Canada, (investiture—October 28, 1969).

SCHOLARLY ADDRESSES

J. S. Crawford, "Problems of Care in the Elderly," Manitoba Health Conference, Manitoba Hospital Association; "Rehabilitation of the Arthritic Patient," St. Joseph's Hospital, Toronto, Senior Nursing Students; "Shoulder Lesions," North York Branson Hospital, Toronto, Medical Staff.

W. O. Geisler, "The Conservative Management of the Neurogenic Bladder in the Spinal Injured Patient. A review of 100 cases," Fifth International Congress of Physical Medicine, Montreal, August 28–31, 1968; also presented at the Annual Meeting of the 24th Canadian Urological Association, Toronto, June 16–18, 1969.

C. M. Godfrey, "Manipulation," to the Lincoln County Academy of Medicine; "Prosthesis: New Hope and Development," to the North Toronto Medical Association.

A. T. Jousse, "Motivation in Rehabilitation," International Conference Work Session on the "Late Effects of Head Injury," March 4–7, 1969, Washington, D.C., under the sponsorship of: The World Federation of Neurology, The World Federation of Neurosurgical Societies, National Institute of Neurological Diseases and Stroke, National Institute of Health; "Paramedical Education in the Field of Rehabilitation in Canada," Fifth International Congress of Physical Medicine, Montreal, August 27, 1968; "The Rehabilitation of the Multiple Sclerosis Paraplegic," Fifth International Congress of Physical Medicine, Montreal, August 27, 1968.

PUBLICATIONS

Godfrey, C. M. "The Arthritic Foot – Shoes" (*Journal of the Canadian Physiotherapy Association*, vol. 20, Dec. 1968, pp. 352–4).

——— *The Cholera Epidemics in Upper Canada 1832–1886*. Toronto: Seccombe House, 1968. Pp. 68.

——— "The First University Hospital" (*Bulletin of the Academy of Medicine*, Toronto, Sept. 1968, pp. 213–14).
——— "Shoes for the Arthritic Foot" (*Applied Therapeutics*, vol. 10, no. 9, Sept. 1968, p. 568).
GODFREY, C. M., and LAWSON, G. A. "Pedal Pressure Changes during Weight Bearing" (*Journal of the Canadian Physiotherapy Association*, vol. 20, Feb. 1968, pp. 17–20).
GEISLER, W. O., and JOUSSE, A. T. "The Management of the Spinal Injured Patient" (*Modern Medicine of Canada*, vol. 23, Dec. 1968, pp. 19–26).

DIVISION OF AUDIO VISUAL RESOURCES

Under the direction of Dr. J. N. Swanson

The Division of Audio Visual Resources is still in the process of being organized. During the year 1968–69 plans were made for the full operation of the Department in the following academic year and, hopefully, staff will be increased in number to cope with these plans next year.

The Division of Audio Visual Resources is divided into three sections: Art, Photography, Television.

Art Section

The Art Section came into being at the end of the academic year with the appointment of Mr. Heinz Loth as Supervisor. Mr. Loth is a graduate of the Toronto School of Art as Applied to Medicine and holds a cross-appointment for teaching in that Department. Coincident with his appointment was the transfer to the Division of two part-time lecturers from Art as Applied to Medicine, Mrs. Bridget Hough and Miss Margot Mackay. Three draftsmen were also transferred at the same time. On July 1, 1969, this section will assume full responsibility for the service part of the work that was formerly undertaken by the Art as Applied to Medicine Department under Professor Nancy Joy, leaving her free to continue her academic training programme.

Photographic Section

Mr. John Kozie is the Supervisor of the Photographic Section. He has an academic cross-appointment in the Art as Applied to Medicine Department to teach principles of photography. Most of this year's programme has been taken up in planning the facilities of the Photographic Section, in particular for the operation of the audio tape/slide seminar programme of Periods III and II of the new medical curriculum. This latter programme is unique. Since it is sufficiently interesting to merit a section of its own, it will be described later.

Television Section

Mr. Terry McAllister became the sole member of this Section on his appointment as Supervisor of Operations and Maintenance in March 1969. He came from a similar position in the Television Station, CFTO, and his experience and widespread knowledge have been invaluable and crucial in the planning not only of television in the Medical Sciences Building but also for the audio portion of the tape/slide seminar programme.

H. K. Davis Associates Ltd. were appointed as consultants for television in the Medical Sciences Building. Since their appointment in April, Mr. Bruce Read has been working closely with the Director and Mr. McAllister in designing the television system for the Building. This was finally approved by the Faculty of Medicine and the University in June 1969. Although only three months were left in which to have the system installed and operating before the beginning of the next academic year, it is believed that the system will be partly effective by that time, even though some plans have been delayed by the construction workers' strike in the Building.

H. K. Davis Associates were also employed, on the recommendation of the Dean, to study the television needs of the ten affiliated teaching hospitals. It is hoped that eventually each of these hospitals will be linked by closed circuit television to the Medical Sciences Building, which will act as Master Control. This will allow a medical programme to originate anywhere in the Faculty for transfer immediately to other parts of the Faculty, or to be stored on video tape in the Medical Sciences Building for future use. The report of the study was presented in April to the Ontario Hospital Services Commission and accepted by them. It is hoped that within the next few years it will be possible to implement its recommendations.

Three experimental television tapes were made during the year to show the scope and limitations of the medium as well as the cost and effort involved in production. The first covered what could be termed a *simple televised lecture*. Dr. Tait McPhedran offered himself for this experiment and the Art as Applied to Medicine staff supplied excellent graphics and visuals. The Producer/Director was Mr. Denny Spence and the Ryerson Institute provided the technical facilities. The title was "An Introduction to the Gastro-Intestinal System." It is planned to use the tape during Period II once television facilities are installed. The second tape made was a *televised presentation of information* and was far more elaborate. The subject was "Oxygen Therapy," and Dr. Colin Woolf wrote the script. Graphics were again produced by the Art as Applied to Medicine Department and the Producer/Director was Mr. Peter Llewellyn. Scarborough College, on this occasion, provided the technical facilities. The third tape was in colour and its purpose was to show whether microscopic slides could be televised effectively, and whether colour was really necessary or monochrome was adequate. Several members of the Department who make frequent use of microscopes (pathologists, bacteriologists, hematologists) were invited to participate. Using telecine film, Dr. J. Finlay demonstrated a gastroscopic examination of the stomach. The Director is glad to acknowledge again the debt to Ryerson Institute for their technical help.

APPOINTMENTS

Dr. Peter Alberti was appointed Associate in the Division of Audio Visual Resources in January, 1969. This was a cross-appointment with the Department of Otolaryngology where he is an Assistant Professor. Dr. Alberti has had an extensive amount of experience in England in audio visual techniques and his advice on the design of the tape/slide system has been invaluable. At the Triological meeting in New Orleans in March he demonstrated the use of Audio Visual aids in the teaching of Otolaryngology and subsequently was appointed Chairman of the Committee on Educational Methods of the American Council of Otolaryngology.

PERIOD III—TAPE/SLIDE SEMINAR INTRODUCTIONS

In Period III of the new curriculum, the final year class of medical students is divided up among eight hospitals. It was originally intended that "lectures" or "seminar introductions" would be televised from one hospital group to all the others, so that the bulk of preparation for the seminar could be done by one lecturer and not involve all eight. When it was realized that this could not be done by television this year or possibly even next year, an alternative method of presenting "core" material was sought. It was decided in November 1968 to design a system using audio tapes and 35 mm slides. A completely new system with no exact counterpart anywhere was devised, though similar prototypes do exist. This system basically consists of a stereophonic audio tape (in a neat, simple cassette) which carries the voice of the lecturer on one track and a cue-tone to activate the slide projector on another. An ordinary standard slide projector is used for the slides. The lecturer records his talk and subsequently this tape and his slides are copied eight times in the Medical Sciences Building Photographic Section and are then distributed to the eight hospitals. These

form the basis of an introduction to a seminar. The seminar leader is present to listen to the talk and lead the discussion afterwards.

In spite of many difficulties, not the least of which was the non-arrival of the high-speed duplicator and the photocopier, the first tapes and slides were delivered to the respective hospitals the weekend before the start of the course. This successful start was in no small measure due to the hard work and devoted efforts of the staff, particularly Mr. Kozie and Mr. McAllister.

The technical as well as the academic aspects of the tape/slide production are currently being evaluated by Dr. Conway of the Educational Research Unit who is associated with this Division.

VISITING LECTURERS

Miss Adele Spiegel, at the invitation of Professor Nancy Joy, gave a talk on "Illustration for Publication," in the Medical Sciences Building in March. An audience of doctors and medical artists attended.

Dr. Yannic Guéguen, Director of the Geigy Film Unit, gave a talk on "The Use of Film in Medical Teaching," at the Toronto General Hospital in April to a large audience. He spoke about, and demonstrated, the use of Super 8 mm cassettes, of which he had produced a great many.

COMMUNICATION COURSE

A course on "Good Communication" was given in April 1969 to the teachers involved in the Period III seminars. The participants in the course were Dr. Neil Watters, the Co-ordinator of Period III; Dr. Norrie Swanson who spoke on "The Nature of Good Medical Communication"; Dr. Peter Alberti on "How to Make Good Audio Tapes"; Mr. John Kozie on "How to Make Good Slides"; Dr. John Flowers gave a brief talk at the end of the session on "Evaluation."

HONOURS

Dr. Peter Alberti has been appointed Chairman of the Committee on Educational Methods of the American Council on Otolaryngology.

Dr. D. Briant of the Otolaryngology Department won the award in the Canadian Medical Association Audio Visual Awards Competition for his film "Transphenoidal Resection of the Hypophysis." The film was made by the Department of Art as Applied to Medicine, with Mr. Ken Elliott as cameraman.

Dr. N. Swanson was appointed Medical Consultant to Sagittarius Films and, as such, advised on the film "Change of Mind" which will be released in the fall of 1969; continued to act as Chairman of the Canadian Medical Association Audio Visual Education Committee; was appointed Program Chairman for the next meeting of the Council on Medical Television to be held in Philadelphia in 1970. This is the first time that such an appointment has been made outside the United States. The Dean has invited the Council to hold their Annual Meeting in Toronto in 1972 and the invitation has been accepted.

SCHOLARLY ADDRESSES

P. Alberti, "The use of Audio Visual Aids in the Teaching of Otolaryngology," Triological Meeting, New Orleans, March, 1969.

J. N. Swanson, "Continuing Medical Education Using Television and Other Audio Visual Aids," College of Family Practice, Ontario Chapter, October, 1968 (accompanied by a live, day-long demonstration of the use of equipment) ; "Facilitation of Education," Ontario Hospital 44th Annual Convention, October, 1968; "Arthromyofasciocollagenology, or 'The Team Approach to Surgery in the Rheumatic

Patient,' " Delaware Academy of Medicine, Wilmington, Delaware, December, 1968; panel participant in "New Dimensions in the Communication of Medical Knowledge," Toronto Academy of Medicine, October, 1968; "Strike Back at Stroke," Riverdale Hospital, Windsor, Ontario, March, 1969; "Slides, Films, Audio Films in Teaching Students, Staff and Patients," Ontario Chapter, Canadian Association of Physiotherapists, March, 1969; "Audio Visual Aids in Medical Education," The Medical Alumni Association, University of Toronto, March, 1969 (accompanied by a live demonstration of equipment); "Television in Medical Teaching," Executive Meeting, Ontario Confederation of University Faculty Association, Trent University, May, 1969; "The Effective Use of Slides and Films, Cassettes and Tapes in Public and Continuing Medical Education," Canadian Rheumatism Association, June, 1969.

TELEVISION TALKS

J. N. SWANSON, "Quackery," Perry's Probe, CTV, January, 1969; "Whiplash," Perry's Probe, CTV, May, 1969; "Chiropractic and Medicine," Judy LaMarsh Programme, CJOH, May, 1969.

DIVISION OF LABORATORY ANIMAL SCIENCE

Under the direction of Professor L. R. Christensen

The Division is progressing with implementation of its charge to integrate and co-ordinate the animal facilities of the Faculty of Medicine. Its consultative and advisory role in animal care matters for the affiliated hospitals continues to increase. Other schools and departments of the University consult with the Division (DLAS) which extends its aid and resources whenever possible. The Animal Caretaker Training Programme, initiated in Canada by the Division last year, is being widely imitated across the country. The disease control laboratory is coming to be recognized as a valuable resource by other Canadian institutions.

Implementation of all DLAS objectives will not be possible until full occupancy of the new Medical Sciences Building and integration of satellite units are accomplished. The present status, in terms of facilities and administration, is as follows:

Medical Sciences Building: The new MSB facilities are essentially completed, and have been occupied by DLAS since May 1, 1969. All major equipment is installed, has been tested, and is working. New animal cages and ancillary equipment are on hand; special equipment—surgical and radiation, for example—is practically all installed; and animal care supervisory staff have been recruited and trained. Investigators have been moving into the new facilities during the last several months, and we expect the majority, if not all, to be installed and operating by late summer.

This, we believe, represents the best, most modern, and largest single animal facility in Canada. We have had numerous visits from architects and staff members of other institutions contemplating new facilities.

Best Institute: The Department of Physiology, one of the major occupants of the Best Institute, will be housed in the MSB, thus significantly reducing the animal requirements at the Best Institute. DLAS assumed responsibility for the Best animal quarters in January, 1969. Although certain improvements in animal care have been possible already, full reorganization of the Best animal facilities must await transfer of all the staff ultimately destined for the MSB. Reductions in the Best animal staff have also been possible, although most of them have been transferred to DLAS. We have been able to utilize cages and equipment released from other areas to upgrade the animal caging in the Best. When all staff moves are completed, a reorganization of the animal area will return significant space to the Best Institute for other uses.

121 St. Joseph St.: This unit is used as a staging area for new staff of the Faculty of Medicine. Animal facilities were constructed in this building last year to serve their needs. Obviously, the use of this unit will fluctuate widely, and at the present time few animals are maintained there.

Stable, 121 St. Joseph St.: Animal facilities in an old garage at No. 1 Spadina Crescent were used for conditioning dogs. These facilities were completely inappropriate for such use and the unit has now been terminated. Renovations were made in the old stable at 121 St. Joseph St., and new caging was purchased. This area is used for the conditioning of dogs for chronic experiments, and is capable of producing approximately 15 conditioned dogs per week. Its capacity is limited and probably will not be adequate to meet our total need. However, it is larger than the terminated facility at Spadina Crescent and allows us to condition dogs under excellent conditions.

Banting Institute: The animal facilities at the Banting Institute will become the responsibility of DLAS as of July 1, 1969. It is anticipated that integration of this unit with DLAS, the accompanying reorganization, and the utilization of DLAS equipment will result in significant savings to the University and improvement in animal care.

Other Units: A number of the affiliated hospitals of the Faculty of Medicine have small animal facilities at the present time. In these units, the difficulty of providing animal care personnel on weekends, holidays, and in case of illness, and the lack of qualified supervision pose problems. In some instances, these small units have requested that DLAS staff supervise their animal facilities, with reimbursement for the direct and indirect costs of such service to be provided. At the present time, DLAS is performing this function for the animal facilities at the Clarke Institute. The Toronto Western Hospital has expressed a desire for a similar arrangement in the revised facilities being considered at Spadina Crescent.

PERSONNEL

Dr. A. L. Fletch, DVM, MSC, has joined the staff of DLAS as veterinary pathologist in charge of disease diagnosis and control. Dr. Fletch was lecturer at the University of Guelph, 1966–68, and for the same period Associate Director of Animal Health, Ontario Zoological Park, where he was in charge of the wildlife disease diagnostic laboratory. Between the Director and Dr. Fletch, DLAS now has diagnostic competence in histopathology, bacteriology, and virology.

Mr. Stan Gregg, formerly of Warner-Lambert, has been appointed Assistant Supervisor for the MSB. Mr. Gregg holds a Senior Animal Caretaker Certificate. Mr. Norman Edwards of the Best Institute has been promoted to Assistant Supervisor for that area.

The majority of animal caretakers on staff have been transferred from other areas of the Faculty of Medicine. A few new appointments have been made to fill vacancies created by retirement or resignation. Mr. Arseneau of the caretaker staff holds a Senior Animal Caretaker Certificate and Mr. Allemand a Junior Certificate.

EDUCATION PROGRAMMES

The first Canadian animal caretaker training programme, organized by DLAS last spring, has been discussed in an earlier report. It is gratifying to note that thirty of the students attending this course have been certified as either Junior or Senior Animal Technicians by the Canadian Association for Laboratory Animal Science (CALAS). A more extensive course for animal caretakers is being organized and will be presented in the fall of this year. As mentioned earlier, the success of this programme has been so great that similar programmes are being started throughout Canada. Queen's University and the University of Ottawa have already conducted such courses, while University of Alberta and Dalhousie and McMaster universities are planning to do so.

DISEASE CONTROL

In addition to its diagnostic and control work for DLAS, the laboratory has been called upon by the Faculty of Dentistry, Departments of Zoology and Psychology, the Clarke Institute, and the Hospital for Sick Children. Dr. Fletch and the Director are also consulted on special disease problems by other institutions in Canada and the U.S.

The disease problems so far encountered are those usually experienced when animals from a variety of uncontrolled sources are used. One function of the diagnostic and control laboratory is to determine those suppliers freest from disease so that we can obtain the best animals for investigators.

A particular problem of major importance at the present time is the occurrence of acute pneumococcal infections in rats. In contrast with the chronic respiratory disease syndrome associated with mycoplasma, this infection produces rapid death from septicaemia or pneumonia in infected animals. Surveys conducted among suppliers in the U.S. and Canada indicate that many commercial sources are contaminated with the causative organism. So far, one Canadian source has been found which does not seem to harbour the pneumococcus, and investigators are being urged to use animals from this source whenever possible. In addition, steps have been taken to keep animals from this clean source isolated from the other animals since we have noted that the infection may spread from infected animals to animals from the clean source. These measures have brought the problem under control.

Ectoparasites, particularly in mice, are a serious problem in animal facilities, especially in breeding colonies. We have determined that a commercial vaporizable insecticide, "Vapona," can be used to rid animals of mites and lice. The studies have also indicated that this particular insecticide, in contrast to many common ones, does not interfere with the breeding of animals, and is not harmful to the young. In summary, this is a better, simpler, and more economical method than those previously used.

Streptococcal infections in guinea pigs are a major problem to all users of these animals. To date, no Canadian source has been found free of this infection.

The laboratory is undertaking several studies aimed at improving the quality of laboratory animals. Among these are epidemiological surveys on the pneumococcal infection of rats. As far as we can determine, pneumococcal typing serum is no longer available in Canada, and it has been necessary to obtain it from the New York City Department of Health, one of the two known sources in North America. A survey to detect the presence of rabbit pox in Canadian animals (our future large rabbit populations will be particularly susceptible to this disease), clinical testing of a new broad spectrum antihelminthic in dogs, and a survey for heart worm infestation in dogs being conditioned for cardiovascular work are also being initiated.

Mention has been made of the dog and cat conditioning centre at 121 St. Joseph St. Dogs will be maintained in this facility for a period of 2 to 3 weeks, will be immunized against distemper, hepatitis, and leptospirosis, will be treated with the appropriate antihelminthics on the basis of fecal sampling, and will be treated for any respiratory or other infections experienced. Cats will be conditioned in a similar manner, although vaccines for some of the usual cat diseases are not as effective as those for the dog viral infections.

Epidemiological data on such factors as incubation periods, reinfection rates, as well as data on effective vaccination and treatment, will be obtained in order to condition animals as economically and efficiently as possible.

HONOURS

DR. L. R. CHRISTENSEN, President, Canadian Association for Laboratory Animal Science, 1968–69; member, Resources Panel, Canadian Council on Animal Care; member, Assessment Panel, Canadian Council on Animal Care; member,

Accreditation Council, American Association for Accreditation of Laboratory Animal Care; Director, American Association for Laboratory Animal Care; Associate Editor, Laboratory Animal Care.

Dr. A. L. Fletch, Chairman, Annual Meeting, Central Ontario Branch, CALAS, 1969.

Mr. E. G. Reid, Chairman, Education Council, CALAS; member, Animal Technician Certifying Board, AALAS.

SCHOLARLY ADDRESSES

Dr. L. R. Christensen, "Aims of Education Programmes for Laboratory Animal Technicians," CALAS Annual Meeting, Kingston, Ont., September, 1968; "Mice Disease Problems Within a Colony," "Disease Problems Within a Rat Colony," "Management of Animals Undergoing Experimentation," Ontario Veterinary Association Meeting, Kingston, September, 1968.

PUBLICATIONS

Fletch, A. L. "Pneumothorax in a Dog with *Birofilaria immitis* Infection" (*Canadian Veterinary Journal*, vol. 10, no. 3, 1969, pp. 80–2).

Fletch, A. L. *et al.* "Four Cases of Systemic Mycosis in Cervids" (*Bulletin of the Wildlife Disease Association*, vol. 5, no. 1, Jan. 1969, pp. 12–15).

——— "Salmonellosis: Report of a Family Outbreak following Direct Contact with Guinea Pigs" (*Canadian Medical Association Journal*, vol. 99, no. 9, Sept. 7, 1968, pp. 418–20).

EDUCATIONAL RESEARCH UNIT

Under the direction of Professor J. F. Flowers

RESEARCH

Experimental Psychological Testing Programme

Our psychological testing of first-year premedical and medical students was continued, with the object of developing a set of tests which would have relevance for prediction studies in a medical school. Early results from the programme have convinced us that we have initiated a promising field of enquiry. The data that we have collected so far should provide the basis for a series of useful studies. A first report, "Personality Correlates of First Year Medical School Achievement," will be published shortly in the *Journal of Medical Education.*

Follow-Up Studies of Medical School Graduates

A follow-up study of graduates, based on a mailed questionnaire survey of the class of 1965, was begun in the spring of 1966. Since then, expanded questionnaires have been given to the classes of 1966, 1967, and 1968. Items on this questionnaire relate to choice of specialty or general practice, advanced training undertaken, location and organization of practice, professional involvements, inclination towards teaching or research, and career influences. A paper reporting results of the first year of this survey entitled "Career Choice Within Medicine" will be submitted for publication shortly.

The Development of a Learning Environment Questionnaire for Use in Curriculum Evaluation

The purpose of this study was to develop and test a learning environment questionnaire designed specifically for use in curriculum evaluation and relating in particular to experiences characteristic of first-year medical school. A paper describing this study has been submitted to the *Journal of Medical Education.*

Instructional Resources Laboratory
An instructional resources laboratory was established under a grant from the Joseph E. Atkinson Foundation. This laboratory will provide a centralized, flexible facility in which the varied problems of audio-visual instruction can be examined with a high degree of precision. This will permit health sciences instructors to develop and evaluate instructional options prior to their costly implementation.

EVALUATION ADVISORY SERVICES

We continued to assist various departments of the faculty in the development of objective measures of student performance. In addition, our staff evaluated and assisted in the development of questionnaires for student and faculty groups. Two projects of special interest are described below.

Student Attitudes Related to a Pediatrics Clerkship
The purpose of this project was to develop an instrument that would measure fourth-year medical students' attitudes towards several aspects of their pediatrics clinical clerkship experience.

It was intended that the scores produced by the test would be used as an aid in evaluating the learning environment of this phase of the clinical clerkship programme. Analysis of the students' mean attitude profile revealed that where definite attitude trends were indicated, they were in the desired direction. A paper describing the study has been submitted to the *Journal of Medical Education.*

Confidence Testing: An Extension of Multiple Choice Testing
The purpose of this project was to explore the possibility of the use of confidence weighting in the scoring of achievement tests. The term "confidence weighting" refers to a particular way of responding to and a particular way of scoring multiple choice items. In this approach the respondent is required not only to select what he thinks is the correct answer from among a list of alternatives, but also to indicate how confident he is in his choice. A respondent will receive more credit for a correct answer chosen confidently than a correct answer chosen with less confidence. Furthermore, a respondent will be penalized for indicating confidence in an incorrect answer. A paper describing the study has been submitted to the *British Journal of Medical Education.*

TEACHING

Endocrinology Teaching Project
A project designed to evaluate the learning habits of undergraduate students was carried out by Dr. J. Bluemenstein. The endocrinology portion of the physiology course presented to second-year students in dentistry was used. The content was reorganized to emphasize the functional principles in hormonal regulation. Illustrations were prepared by the Department of Art as Applied to Medicine. While the attitude of the student toward the course was described as positive, the bulk of the learning apparently took place just prior to the final examinations. This phenomenon is being investigated further.

Sunnybrook Seminar for Residents
A series of seminars was conducted as part of the inservice educational programme for the residents. The purpose of this series was to stimulate thinking on the part of the residents in areas somewhat remote from the customary, practical, training experiences. The seminar method of presentation has been chosen because a subsidiary purpose of the programme was to give the participants experience in seminar-type instruction. The programme was as follows: "Computer-Aided Differential Diagnosis," Dr. R. S. Julius; "The Evolution of Professional Attitudes," Dr. B. Quar-

rington; "Techniques for Effective Learning and Teaching," Dr. J. Flowers; "The Evaluation of Clinical Performance," Dr. A. Rothman; "The Communication of Ideas," Dr. J. O. Godden. We plan to offer a similar series to other teaching hospitals during October and November, 1969.

PUBLICATIONS

CONWAY, J. K. "Information Presentation, Information Processing, and the Sign Vehicle" (*AV Communication Review*, vol. 16, no. 4, winter 1968, pp. 403–14).
ROTHMAN, A. I. "The Effects of Teaching a New Physics Course on Teacher Attitudes" (*Science Education*, vol. 52, no. 5, Dec. 1968, pp. 466–9).
——— "The Factor Analysis of the Science-related Semantic Differential Instrument" (*Journal of Educational Measurement*, vol. 5, no. 2, summer 1968, pp. 145–9).
——— "Responses to Science Concepts on a Semantic Differential Instrument and Achievement in Freshman Physics and Chemistry" (*Research in Science Teaching*, vol. 5, 1967–8, pp. 168–73).
ROTHMAN, A. I. *et al.* "Effects of a Summer Institute on Attitudes of Physics Teachers" (*Science Education*, vol. 52, no. 5, Dec. 1968, pp. 469–73).
——— "Physics Teacher Characteristics and Student Learning" (*Research in Science Teaching*, vol. 6, no. 1, 1969, pp. 59–63).
——— "The Success of Recruited Students in a New Physics Course" (*Science Education*, vol. 52, no. 3, April 1968, pp. 270–3).

MEDICAL SOCIETY

(September 1968 to June 1969)

Honorary President	Dean A. L. Chute
President	S. Kushnir
Vice-President	M. A. Hutcheon
Treasurer	M. I. Pascoe
Executive Secretary	J. R. Carlisle, Jr.

EXTRACURRICULAR ACTIVITIES

CAMSI programmes led by Sherryn Levinoff and Allan Bellack included a very successful drug appeal which accumulated tons of drugs for distribution to underdeveloped areas.

Daffydil was produced by Bill Fitzgerald and written and directed by Arnold Shoichet, each completing a number of years of successful association with this annual production.

Social events were arranged by Dan Schachter; the annual Medical Formal held at Casa Loma was especially successful.

Sports activities included successes in the intramural program. The football team made the finals for the Mulock Cup; the basketball team won the intramural championship; and the waterpolo team tied for first place. Over all, the Faculty of Medicine tied for the T. A. Reed Trophy for best faculty participation.

Individuals won many awards as well: at the CIAU swim championships, Theo van Ryn won three firsts, while Terry Bryon also placed high; Paul Kent gained second spot in the OQAA tennis championships, and Dave Carll was awarded the Sidney Earle Smith Trophy for best intramural athlete of the year.

University of Toronto Medical Journal co-editors, Abe Chaiton and Paul Muller, continued the successful format of the publication. Six issues were produced this year from the largest journal budget ever.

The Duncan Room was located temporarily in the new building, with Michael Chambers as Warden. The concession was held by Mrs. Hemstead. This was the Duncan Room's final year of operation. The new cafeteria, and the absence of permanent facilities for a Duncan Room in the new building caused its demise. Next year, the Alumni will furnish a Common Room for the students' use.

CURRICULAR ACTIVITIES

Constitution changes were made at the beginning of the year to increase the size and representation of the Medical Society Assembly to include the student members of Faculty Committees.

Committees included a number of standing committees of students who participated with as yet undetermined effect and success on most Curriculum and Faculty Council Committees (except the Committee on Curriculum and Examinations, of course).

A number of *ad hoc* committees were also established to evaluate student participation, curriculum, and education, and to develop a philosophy of education and aims and objectives for the Medical Society.

Office facilities were developed to permit proper organization, communication, and recording of activities; office equipment and services were obtained with the assistance of the Faculty Administration; a secretary was hired by the students to deal with the increased paperwork more efficiently.

Auricle editor, the official bulletin of the Medical Society distributed free to all medical students, was Paul Hejja, Jr. Information given in this publication included the first detailed summary of the New Curriculum to be made available to students, and a lengthy summary of the more important events occurring in the Faculty of Medicine during the year.

Elections were held in March under the provisions of another new Constitution, which completely reorganized the structure of the Medical Society Assembly to provide more effective student representation and liaison with the staff and administration.

President for 1969-70 is David Beatty.

Honour Awards were given by the Medical Society to ten members of the graduating class for their contribution to the Faculty. The recipients were: Ron Baigrie, John R. Carlisle Jr., Bill Fitzgerald, Chris Hill, Richard Isaac, Stan Kushnir, Arn Shoichet, Bob Sorokolit, Bob Walker, Marv Waxman.

STAN KUSHNIR

MEDICAL WOMEN'S UNDERGRADUATE ASSOCIATION

(September 1968 to June 1969)

Honorary President	Dr. B. Steiner
President	Christina E. Hill Koch
First Vice-President	Robin Williams
Second Vice-President	Elizabeth Wright
Treasurers	Susan Lush
	Juliette White
Secretary	Mary Vearncombe

This year the first major task of the MWUA was the continuation of the previously implemented Big Sister–Little Sister Programme. The Executive busied itself during the summer months organizing a group of volunteer "Big Sisters" from the first and second medical years, and compiling a list of "Little Sisters," all those female students new to the membership of the MWUA. All "Big Sisters" communicated individually with their "Little Sisters" by letter before the term began. A tea was held one Sunday afternoon early in September in the Toronto General Hospital Students' Lounge, to introduce "Little Sisters" both to their "Big Sisters" and to the functions and activities of the MWUA.

Early in the first term a newsletter was distributed to all members to acquaint them with the new MWUA Executive, to outline the projected activities of the MWUA for the coming year, and to invite suggestions from the members pertaining to improvement of the usefulness of the Association to the membership as a whole. A list

of women doctors who had volunteered their services as advisers was circulated at the same time.

The annual Initiation Banquet, sponsored by the Federation of Medical Women of Canada, was held early in November. The meal, well attended by students and graduates, was served in the elegant surroundings of the Great Hall in Hart House.

The traditional Christmas Party was discontinued this year, because of dwindling support during the preceding few years and of the increasing pressure of work due to end-of-term examinations which fell immediately prior to the Christmas holidays.

A film night was held at the end of January in the Duncan Room of the new Medical Sciences Building. A film on open heart surgery was of special interest to the premedical students since it was their first taste of real clinical medicine.

Perhaps the most significant event of this session was a re-evaluation of the purposes and structure of the MWUA and its subsidiary organization, the Medical Women's Athletic Association. Changes in the Medical Society constitution, and the abolishment of the Premedical Course from the Faculty of Medicine, necessitated changes in our own constitution. A tentative new constitution was passed by the membership of the MWUA to accommodate both these changes and a change in the needs of the student body for a distinctly female organization. It was concluded that sports activities would take increasing precedence as enrolment increased and as overt prejudice towards female medical students decreases steadily over the years.

The most important changes considered, subject to approval by the Medical Society and the Women's Athletic Association Directorate, concerned: the merger of the MWUA and MWAA; changes in the executive structure and duties of officers; abolishment of premedical students as compulsory members of the Association. If approval is forthcoming, the new constitution will be in effect as soon as possible.

In closing I should like to thank the Federation of Medical Women of Canada for their interest in us and support of our activities. A special word of thanks goes to Dr. Betty Steiner, our Honorary President, for all her help and encouragement during the last year. I wish also to extend my gratitude to all the members of the Executive who often worked far into the night to effect completion of MWUA projects. Their support lent vitality and strength to the Association and made possible many activities which otherwise might not have taken place.

CHRISTINA E. HILL KOCH

MEDICAL WOMEN'S ATHLETIC ASSOCIATION

(September 1968 to May 1969)

President	Robin C. Williams
Vice-President	Wanda Webster
Secretary-Treasurer	Gail Porter
Athletic Representatives	Carolyn Bennett
	Barbara Baxter
	Carolyn DeMarco
	Jenny Lobb
	Barbara Bullied
	Gail Porter

The Medical Women's Athletic Association had a very successful 1968–69 athletic season, representing the Faculty of Medicine within the intramural league of the Women's Athletic Association of the University. The Faculty entered teams in swimming, diving, tennis, badminton, volleyball, basketball, and ice hockey, comprised of some 40 women from all six years. No cups were won, but the spirit of our teams was never daunted, and these teams are looking forward to the coming year for a more profitable endeavour.

The athletic season was terminated with the annual banquet held at Lichee Garden on Thursday, March 13. Medical awards were presented to Violet Shadd, Widet MacLean, Pat Blachford, and Gail Porter. The awards have been changed to charms in keeping with the new award system adopted by the Women's Athletic Directorate. The University awards were presented by Miss Ann Hewitt, Director of Women's Athletics, who delivered a short speech after dinner.

I should like to thank the Past President, Pat Blachford, for her advice and support, my enthusiastic and dependable executive, and the medical women who played or coached our teams, for helping to make the 1968–69 athletic season a most successful and enjoyable one.

ROBIN C. WILLIAMS

BIOLOGICAL AND MEDICAL DIVISION UNIVERSITY LIBRARY

Reported by H. C. Sholler

The use of material in the Biological and Medical Division of the University Library continued to rise. Volumes lent to the Faculty numbered 21,773, and to graduate students 12,883. Staff and students borrowed 16,348 current periodicals. Medical students took advantage of their special "Reserve" privileges and made very good use of the open Reserve collection; 32,236 volumes were circulated. The teaching hospitals borrowed 12,982 volumes, an increase of 76 per cent.

Once again we are greatly indebted to the many staff members who have made recommendations in their special fields.

REPORT ON REGISTRATION, SESSION 1969–1970

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Diploma in Medical Radiology	42
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Other Postgraduate Students	951
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Speech Pathology and Audiology	24
Student Teachers	5
	2,267

FELLOWSHIPS, SCHOLARSHIPS, MEDALS AND PRIZES

GRADUATE

W. P. Caven Memorial Fellowship	T. Nakai, M.D., Ph.D.
William Goldie Prize	J. G. Humphrey, M.D., F.R.C.P.(C)
Dr. Arthur F. Haasz Fellowship	V. K. Murthy, B.Sc., M.Sc., Ph.D.
Arch Hutchison Fellowship	J. McConnon, M.B., Ch.B.
Frances Esther Hutchison Fellowship	V. K. Murthy, B.Sc., M.Sc., Ph.D.
Inez Gwendolyn Inglee Scholarship	Miss D. Nussey, B.Sc.
Lister Prize in Surgery	P. Khunavudhi, M.D.
Alexander McPhedran Research Fellowship	J. McConnon, M.B., Ch.B.
Minister of Health Gold Medal	E. Persad, M.B., B.S.
Anna Bradbury Springer Award	A. Robinson, M.D., M.R.C.S., L.R.C.P. (Lond.), B.Ch.(Eng.), M.R.C.P. (Lond.)

Edward Christie Stevens Fellowships	J. Brebner, M.D. Miss A. Hedlin, B.Sc.(N), M.Sc.
John Alexander Stewart Fellowships	V. K. Murthy, B.Sc., M.Sc., Ph.D. J. McConnon, M.B., Ch.B. K. S. Desai, M.N.S., Ph.D.

Undergraduate

Fourth Medical Year

Cody Gold Medal	J. S. Keystone	
Cody Silver Medal	A. J. Shoichet	
Cody Silver Medal	P. J. Muller	
Dr. Benjamin W. Appleton Prize in Psychiatry	M. S. G. Bell	
J. P. Boley Prize in Ophthalmology	Miss S. E. Stafford	
Louis Browner Memorial Scholarship	D. E. Griesdale	
Butterworth Prize	J. K. J. Foster	
Irving Heward Cameron Undergraduate Scholarship	J. S. Keystone	
Chappell Prize in Clinical Surgery	P. J. Muller	
Dr. Jacob Goldstein Scholarship	S. J. Langer J. D. Kempston	Aeq.
Hendry Memorial Scholarship	J. S. Keystone J. T. Miles	Aeq.
Issei Scholarship in Medicine and Surgery	J. D. Kempston	
Dr. Louis Kagan Memorial Award	Miss S. E. Stafford	
Medical Alumni Association Scholarships	M. S. G. Bell, S. Berger, N. D. Berman, S. J. M. Cartan, T. E. Daglish, Miss P. E. Fitzsimmons, Miss L. D. Hadley, Mrs. P. J. Hierlihy, J. D. Kempston, E. C. Keystone, J. S. Keystone, J. S. McLean, J. T. Miles, P. J. Muller, A. J. Shoichet	
Ellen Mickle Fellowship	A. Chaiton J. S. Keystone A. J. Shoichet	Aeq.
Ontario Medical Association Prize in Preventive Medicine	Miss R. A. Jong A. J. Shoichet	Aeq.
Dr. Roy Simpson Scholarship in Paediatrics	P. J. Muller	
Starkman Memorial Scholarship in Medicine	P. J. Muller	

Third Medical Year

Dr. F. J. Colling Scholarship (renewal)	G. C. P. Ebers S. Greenberg M. A. Hutcheon P. G. Levy P. R. McLaughlin E. M. Mintz	
Franckel Memorial Award	G. C. P. Ebers	
J. F. Hartz Company Prize in Ophthalmology	P. R. McLaughlin	
J. F. Hartz Company Prize in Oto-Laryngology	P. G. Kent	
Frank W. Horner Gold Medal	P. R. McLaughlin	
Dr. Mitchell Kohan Scholarship	Miss N. H. McKee	
Saddington Medal in Pathology	G. C. P. Ebers	
Starkman Memorial Prize in Pharmacology and Therapeutics	H. Krieger	
Starkman Memorial Scholarship in Preventive Medicine	S. Greenberg	
Samuel J. Streight, O.B.E., M.D., Scholarship in Internal Medicine	W. K. Evans	
Dr. C. S. Wainwright Memorial Scholarship (renewal)	Miss N. H. McKee	
Walter F. Watkins Scholarship	shared by: A. O. Davies, M. A. Hutcheon, Miss K. E. Magee, E. A. Robinson, Mrs. G. M. Thomas, E. W. T. Turgeon, Miss R. C. Williams	

Second Medical Year

Dr. W. R. Campbell Scholarship	Miss S. Chu
Dr. F. J. Colling Scholarship	shared by: S. Hafner, R. N. McKenzie, E. Magi, L. Refling, G. D. Schachter
John Copp Bursary	T. A. Van Ryn
Geoffrey Samuel Gangbar Memorial Prize	Miss J. E. Haglund
Posluns Brothers Scholarship	D. J. McNeely
Dr. C. S. Wainwright Memorial Scholarship (renewal)	E. L. Book J. R. B. Bristowe Miss J. E. Haglund R. E. Hibbard
Walter F. Watkins Scholarship	shared by: J. R. B. Bristowe, B. W. Gilbert, S. D. Levinson, D. J. McNeely, H. A. Sadauskas, C. Shustik, S. J. Stern, J. Weinstock

First Medical Year

Dr. Thomas Arnold McCormack Scholarship	Miss A. R. Gishman
Starkman Memorial Scholarship in Anatomy	L. Eason
Dr. C. S. Wainwright Memorial Scholarship	shared by: Miss P. A. Clifford, I. Horowitz, R. M. A. Richardson, J. R. Scarrow
Walter F. Watkins Scholarship	shared by: M. P. Chatterson, G. I. Goldlist, J. C. Gustafsson, O. J. Mandel, D. Pang, J. D. H. Silverberg, T. C. H. Tam
John Zoberman Scholarship	L. Eason

Second Premedical Year

Famous Players Canadian Corporation Scholarship	M. B. Ginsberg
Fulford Scholarship (No. 4 Canadian General Hospital)	M. B. Ginsberg
Dr. & Mrs. M. A. Pollock Award	L. G. Hancock

Division of Rehabilitation Medicine

Beatrice Hally Memorial Prize	Mrs. S. R. Gerard

ANAESTHESIA

Under the direction of Professor R. A. Gordon

The session has again been devoted to review and revision of the academic programmes of the Department at all levels, and in particular to detailed consideration of the teaching responsibilities of the Department in Period II and Period III of the new Curriculum. In the meantime the teaching of undergraduate students in the third and fourth years of the Medical Course has continued in the pattern of the previous session. Emphasis in the undergraduate course has been on resuscitation, maintenance of the airway, ventilation, and general care of the unconscious patient. The sense of uneasiness and frustration, which was noted in our last report as arising from uncertainties surrounding the provision of facilities and staffing in the teaching hospitals has in no way abated.

There were fifty-one postgraduate students in the Department during the year, twenty-two of whom were registered for the Diploma, the remainder being sessional students.

The Diploma in Anaesthesia of the University of Toronto was awarded to Dr. D. J. Armstrong, Dr. G. De Young, Dr. G. Eckert, Dr. K. Egan, Dr. Wm. Noble, Dr. B. Pekanen, and Dr. A. Russell.

The Tenth Dr. Harry Shields Lecture was given on December 6, 1968 by Professor Philip Bromage of McGill University. Professor Bromage's subject was "Time and the Anaesthetist." Visiting Professors during the session were Professor Charles Pittinger of Vanderbilt University and Professor Sir Robert Macintosh of Oxford. These visitors made significant contributions to the postgraduate teaching programme of the Department.

The Department has been pleased to welcome a number of other distinguished visitors during the year, among them the following: Professor Richard Kelman, University of Aberdeen; Dr. Brian Dwyer, Sydney, Australia; Dr. Salard Tupavong, Siriraj Medical School, Bangkok; Dr. John P. Ritchie, Dunedin, Australia; Dr. Mary Burnell, Adelaide, South Australia; Dr. Carlos Parsloe, Sao Paulo, Brazil; Dr. Herbert H. Pinkerton, Glasgow; Prof. J. Payne, Royal College of Surgeons of England.

Dr. Alan Noble has joined the Department as Professor and Anaesthetist-in-Chief at Sunnybrook Hospital. Dr. Samuel Galloon has joined the Department as Assistant Professor on the staff of the Toronto General Hospital. Dr. Douglas Blenkarn has been appointed Assistant Professor and has assumed responsibility for Hyperbaric Medicine at the Toronto General Hospital. Dr. Arthur Scott and Dr. Evan Lloyd have been appointed Clinical Teachers at the Toronto General Hospital, Dr. Simon Tindal at Wellesley Hospital, Dr. Kirk Weber and Dr. John Emmett at Sunnybrook Hospital. Dr. Ian Nisbet has joined the Department at the Hospital for Sick Children as a member of the Research Institute of that Institution. Dr. John Jacobs has returned to the staff of St. Michael's Hospital from the University of Lagos.

Professor R. A. Gordon was elected Vice-President of the World Federation of Societies of Anaesthesiologists at the General Assembly held in London, England, in September, 1968, and was appointed Co-Chairman of the WFSA Education and Relief Foundation. Professor Gordon is also Editor of the *Canadian Anaesthetists' Society Journal.*

Professor Lucien Morris was Chairman of one of the Scientific Sessions of the World Congress of Anaesthesiologists in London, England, in September, 1968.

Professor H. B. Fairley was Chairman of a Symposium on Intensive Care at the World Congress of Anaesthesiologists in London in September, 1968, and Chairman of a panel on "Mechanical Ventilation" at the Boston Respiratory Conference in November, 1968. Professor Fairley left the Department in January, 1969 to become Professor at the University of California, San Francisco Medical Center.

Dr. James Kerr was Chairman of an International Panel on Perinatal Resuscitation at the Annual Meeting of the Canadian Anaesthetists' Society in June 1969.

RESEARCH

At the Toronto General Hospital Dr. P. Ramachandran, with Professor H. B. Fairley and Dr. Alan Laws, has studied changes in Functional Residual Capacity associated with prolonged recumbency, oxygen breathing, and during respiratory failure.

Dr. R. W. McIntyre, with Dr. Alan Laws, has established techniques for the measurement of pulmonary gas exchange and cardiac output during respiratory failure. Using these techniques, the effects of chest physiotherapy and of different patterns of ventilation have been examined.

Dr. Alan Laws has established a technique for assessment of regional ventilation using radioactive Xenon and is using this to investigate the ventilatory abnormalities associated with recumbency while breathing a soluble gas, during anaesthesia, and in respiratory failure.

Dr. Douglas Blenkarn, in collaboration with Dr. J. Hayes of the Department of Pathology, has studied the physiological and pathological effects of bilateral lung lavage using hyperoxygenated saline in dogs. In collaboration with Dr. Walter Zingg and Mr. George Pyfrom of the Hospital for Sick Children, Dr. Blenkarn has begun

a study of the performance of various membrane oxygenators in the hyperbaric chamber.

Dr. B. M. Marshall has continued studies of problems related to cerebrovascular spasm in association with Dr. W. M. Lougheed of the Division of Neurosurgery.

Dr. Ramon Evans has continued his studies in the management of intractable pain, supported by the Irene Eleanor Smythe Fund.

Dr. John Desmond has continued his investigations of changes in serum electrolytes and osmolality and factors influencing bleeding during transurethral prostatic surgery. Dr. Desmond has also studied changes in blood volume and plasma cholinesterase in bilaterally nephrectomized patients and has instituted a study of aspiration during prolonged intra-abdominal surgery.

Dr. Beverley Britt, with Professor Werner Kalow of the Department of Pharmacology, has continued her studies of malignant hyperthermia occurring during the administration of anaesthetic agents, and in particular the study of families in which this trait is demonstrably hereditary. Dr. Britt has also studied the influence of halothane on animals with malignant tumours after treatment by radiation.

Dr. John Brebner has continued his work on esterases in Professor Kalow's laboratory.

At the Toronto Western Hospital Dr. David Evans has instituted a study of the effects of veno-arterial bypass on cardiovascular parameters in the dog.

Dr. W. M. Jones and Dr. H. W. Boyes have continued studies on the use of neuroleptanalgesia in association with local anaesthesia for intra-ocular surgery and stapes surgery, and have completed a study of the use of promethazine and meperidine as supplementary agents to local anaesthesia for intra-ocular surgery.

Dr. Boyes and Dr. A. Russell have continued the study of anaesthetic problems related to serious renal disease and renal homotransplantation.

Dr. David Evans and Dr. S. Ozer are studying anaesthetic problems related to cardiac transplants.

At St. Michael's Hospital, Professor Lucien Morris, with the assistance of Dr. D. C. Lee, Dr. Patrick V. Murphy, Dr. Joseph Sodipo, Dr. Edith Simandl, and Dr. Valerie Jones, has carried out studies of blood flow in the ascending aorta of the dog by means of chronically implanted electronic flow probes during acid-base changes in the conscious state and during anaesthesia with halothane and fluoroxene; studies of ventilation response to carbon dioxide in the dog during halothane anaesthesia in the normothermic, hypothermic, and hyperthermic states; and the effects of acid-base changes on muscle tone.

At the Hospital for Sick Children, Dr. I. A. J. Sloan has investigated lactate and pyruvate metabolism during halothane and methoxyflurane anaesthesia, and lactic acidosis in paediatric cardiac anaesthesia.

Dr. A. E. Johnston, with Dr. H. I. A. Nisbet, has studied cardiovascular responses to hypoxia under methoxyflurane anaesthesia in the dog.

HONOURS

Professor R. A. Gordon was awarded the Gold Medal of the Canadian Anaesthetists' Society for Distinguished Service in Anaesthesia.

SCHOLARLY ADDRESSES

Dr. G. D. Blenkarn: "The Hyperbaric Chamber," to the College of Family Physicians of Canada, November, 1968; "Current and Future Concepts of Hyperbaric Medicine," to the First Canadian Hyperbaric Technical Seminar, February, 1969; "A Physiologic Approach to Oxygen Therapy," to the University of North Carolina, April, 1969; "Effect of Oxygenation on Cells and Systems," Fourth Symposium on Underwater Physiology, Philadelphia, June, 1969.

Dr. A. W. Conn: "Role of Inhalation Therapy in the Intensive Care Unit,"

at the 4th World Congress of Anesthesiologists, London, England, September, 1968; "Problems in the Anaesthetic Management of Children" and "Inhalation Therapy in Paediatric Anaesthesia," to the Georgia Society of Anaesthesiologists, Atlanta, Ga., September, 1968; "Role of Inhalation Therapy in Intensive Care," to the Canadian Society of Inhalation Therapy Technicians, Annual Meeting, October, 1968; "Paediatric Intensive Care," "Anaesthesia for Pyloromyotomy," "Complications during Induction and Maintenance of Anaesthesia," "The Use of Explosive Anaesthetic Agents," and "Prolonged Nasal Intubation *v.* Tracheotomy," to the 14th Annual Anaesthesia Course, University of Utah, Salt Lake City, Utah, February, 1969; "Malignant Hyperthermia" and "Anaesthesia for Neonates," at the University of California, San Francisco and Davis, April, 1969; "Malignant Hyperthermia," at the Annual Scientific Assembly, California Society of Anesthesiologists, Los Angeles, April, 1969; "Complications in Paediatric Anaesthesia" and "Paediatric Intensive Care," at Albert Einstein University, New York City, N.Y., April, 1969; "Paediatric Intensive Care" and "Complications in Paediatric Anaesthesia," at University of Missouri, Columbia, Mo. and St. Louis Society of Anesthesiologists, St. Louis, Mo., April, 1969.

Dr. John Desmond: "Problems Related to Transurethral Prostatic Surgery" and "Water Intoxication," at Elmira, New York, June, 1969; "Bleeding During Transurethral Prostatic Surgery" and "Changes in Osmolality and Electrolytes During Transurethral Prostatic Surgery, and Their Significance," to the Canadian Urological Society, June 18, 1969; "The Effect of Haemodialysis on Blood Volume and Plasma Cholinesterase in Bilaterally Nephrectomized Patients," to the Canadian Anaesthetists' Society Annual Meeting, June 19, 1969.

Dr. David Evans: "The Effects of Veno-Arterial Bypass on Cardiovascular Parameters in the Dog," to the Royal College of Physicians and Surgeons of Canada in Vancouver, B.C., January, 1969.

Professor H. B. Fairley: "Intensive Care," The World Congress of Anaesthesiologists, London, England, September 11, 1968; "Current Concepts in Mechanical Ventilation," to the Atlantic Regional Meeting, Canadian Anaesthetists' Society, Halifax, N.S., September 26, 1968; "The Patient with Respiratory Paralysis," to the Section on Anaesthesia, Ontario Medical Association, Kingston, Ont., October 4, 1968; "Physiology and Management of Crushing Chest Injuries," at McGill University, Montreal, November 4, 1968; "Mechanical Ventilation" (Panel), at the Boston Respiratory Conference, Boston, Mass., November 7, 1968; "Resolved that Flammable Anaesthetic Agents be Banned from Hospital Practice" (Debate), New York State Society of Anaesthesiologists Post-graduate Assembly, New York City, December 16, 1968.

Dr. D. C. Finlayson: "Fluid and Electrolyte Therapy in Surgical Patients," "Shock," "Management of Spinal Anaesthesia," McKellar General Hospital, Fort William, Ontario, October, 1968; "Parental Therapy in Relation to Surgery," "Clinical Pharmacology of Manitol," "Pathophysiology and Treatment of Shock," Sensenbrenner Hospital, Kapuskasing, Ontario, September 1–5, 1969; "Fluid and Electrolyte Therapy in Surgical Patients," "Shock," Soldier's Memorial Hospital, Orillia, Ont., March 21, 1969; "Management of Patient With Acute Respiratory Failure," the Ontario Society of Allergists, November 23, 1968.

Dr. J. B. Gilbert: "Respiratory Unit Care," to the North Bay Branch, Ontario Medical Association, June 4, 1969.

Dr. A. E. Johnston: "Anaesthesia for Neuromuscular Disorders," to the Section on Anaesthesia, Ontario Medical Association at Kingston, Ontario, October, 1968.

Dr. Alan K. Laws: "Chest Physiotherapy During Respiratory Failure and its Effects on Gas Exchange and Cardiac Output" and "The Role of Positive Pressure Expiratory Plateau in Artificial Ventilation," at the Annual Meeting of the Canadian Anaesthetists' Society, June, 1969.

Dr. B. M. Marshall: "Current Views on Neurosurgical Anaesthesia," to the

Section on Anaesthesia, Ontario Medical Association at Kingston, Ontario, October 5, 1968; "The Value of the Anaesthesiologist to the Neurosurgeon," at the 37th Annual Meeting of the American Association of Neurological Surgeons, Cleveland, Ohio, April, 1969; "Neurosurgical Anaesthetic Technique and Management of Problem Cases," University of North Carolina, Chapel Hill, April 7, 1969.

Dr. R. McIntyre: "Physiological Indices of Pulmonary Status in Respiratory Failure," at the Annual Meeting, Canadian Anaesthetists' Society, June 17, 1969.

Dr. H. I. A. Nisbet: "Cardiovascular Responses to Hypoxia under methoxyflurane Anaesthesia," to the Clinical Investigation Society, Edmonton, Alta., June, 1969.

Dr. P. R. Ramachandran: "Changes in Functional Residual Capacity in Respiratory Failure," at the Annual Meeting, Canadian Anaesthetists' Society, Toronto, June 17, 1969.

Dr. J. E. S. Relton: "Hyperpyrexia," to the Anaesthetic Section, American Academy of Paediatrics, Chicago, October, 1968.

Dr. Wells A. Renwick: "Problems in Anaesthesia" (Seminar), at the McKellar General Hospital, Fort William, Ontario, April 14, 1969.

Dr. Arthur Scott: "The Diagnosis of Respiratory Failure," to the Canadian Anaesthetists' Society Symposium on Respiratory Care, Toronto, June 15, 1969.

Dr. I. A. J. Sloan: "The South American Continental Training Centre for Anaesthesiology," to the Academy of Anesthesiology, October, 1968.

Publications

Blenkarn, G. D. "Hyperbaric Oxygen: Limitations and Current Applications" (*Ontario Medical Review*, vol. 35, no. 12, Dec. 1968, pp. 3–8).

Blenkarn, G. D., Schanberg, S. M., and Saltzman, M. A. "Cerebral Amines and Acute Hyperbaric Oxygen Toxicity" (*Journal of Pharmacology and Experimental Therapeutics*, vol. 166, no. 2, April 1969, pp. 346–53).

Britt, B. A., and Gordon, R. A. "Three Cases of Malignant Hyperthermia with Special Consideration of Management" (*Canadian Anaesthetists' Society Journal*, vol. 16, no. 2, March 1969, pp. 99–105).

Britt, B. A., Locher, W. G., and Kalow, W. "Hereditary Aspects of Malignant Hyperthermia" (*Canadian Anaesthetists' Society Journal*, vol. 16, no. 2, March 1969, pp. 89–98).

Brothers, M. A., and Finlayson, D. C. "Evaluation of Low Back Pain by Differential Spinal Block" (*Canadian Anaesthetists' Society Journal*, vol. 15, no. 5, Sept. 1968, pp. 478–81).

Conn, A. W. "Practical Policy for Non-explosive Anaesthesia" (*Canadian Anaesthetists' Society Journal*, vol. 15, no. 4, July 1968, pp. 378–83).

Desmond, J. W., and Gordon, R. A. "Bleeding during Transurethral Prostatic Surgery" (*Canadian Anaesthetists' Society Journal*, vol. 16, no. 3, May 1969, pp. 217–24).

De Young, G. G., Harrison, A. W., and Shapley, J. M. "Herpes Simplex Cross Infection in the Operating Room" (*Canadian Anaesthetists' Society Journal*, vol. 15, no. 4, July 1968, pp. 394–6).

Finlayson, D. C. "Fluid and Electrolyte Requirements during Anaesthesia and Surgery" (*Nova Scotia Medical Bulletin*, vol. 47, June 1968, pp. 117–20).

Gordon, R. A. "Regional Block of the Femoral and Obturator Nerves" (*West African Medical Journal*, vol. 17, no. 6, Dec. 1968, pp. 171–2).

Hunter, M. E. "Circadian Rhythms and their Significance to the Anaesthetist: A Review" (*Canadian Anaesthetists' Society Journal*, vol. 16, no. 3, May 1969, pp. 253–9).

Jones, W. M., and Boyes, H. W. "Neuroleptanalgesia for Stapes Surgery" (*Archives of Otolaryngology*, vol. 88, Nov. 1968, pp. 57–60).

Jones, W. M., Samis, S., Macdonald, D., and Boyes, H. W. "Anaesthesia for Intraocular Surgery" (*Canadian Journal of Ophthalmology*, vol. 3, no. 4, Oct. 1968, pp. 337–41).

——— "Neuroleptanalgesia for Intraocular Surgery" (*Canadian Anaesthetists' Society Journal*, vol. 15, no. 6, Nov. 1968, pp. 519–27).

Laws, A. K. "Effects of Induction of Anaesthesia and Muscle Paralysis on Functional Residual Capacity of the Lungs" (*Canadian Anaesthetists' Society Journal*, vol. 15, no. 4, July 1968, pp. 325–31).

Marshall, B. M., and Gordon, R. A. "Electroencephalographic Monitoring in Anaesthesia with Droperidol and Fentanyl" (*Canadian Anaesthetists' Society Journal*, vol. 15, no. 4, July 1968, pp. 357–61).

NOBLE, A. B. "The Medico-Legal Aspects of Anaesthesia" (*Canadian Anaesthetists' Society Journal*, vol. 16, no. 3, May 1969, pp. 195–203).
PELTON, D. A., and CONN, A. W. "A Bronchoscopic Adaptor for Intermittent Positive Pressure Breathing in Children" (*Canadian Anaesthetists' Society Journal*, vol. 15, no. 6, Nov. 1968, pp. 628–9).
RAMACHANDRAN, P. R., FAIRLEY, H. B., and LAWS, A. K. "Central Venous Blood as an Index of Acid-Base and Oxygenation Status" (*Canadian Anaesthetists' Society Journal*, vol. 15, no. 4, July 1968, pp. 332–46).
RENWICK, W. A. "Epidural Anaesthesia for Caesarean Section" (*West African Medical Journal*, vol. 17, no. 6, Dec. 1968, pp. 183–4).
STEWARD, D. J., and CONN, A. W. "A Clip to Retain and Support Nasotracheal Tubes" (*Canadian Anaesthetists' Society Journal*, vol. 15, no. 4, July 1968, pp. 397–8).
STEWARD, D. J., and SLOAN, I. A. J. "Recent Upper Respiratory Infection and Pulmonary Artery Clamping in the Aetiology of Post-operative Respiratory Complications" (*Canadian Anaesthetists' Society Journal*, vol. 16, no. 1, Jan. 1969, pp. 57–60).
SUN, S., and FINLAYSON, D. C. "Haemodynamic Changes during Apnoeic Oxygenation in Dogs: Comparison between the Intact and the Pharmacologically Denervated Heart" (*Canadian Anaesthetists' Society Journal*, vol. 16, no. 1, Jan. 1969, pp. 18–26).

ANATOMY

Under the direction of Professor J. S. Thompson

During the year 1968–69 the Department of Anatomy experienced certain changes. These may be outlined as follows:

TEACHING

The staff of the Department spent much of their time in planning new curricula in Medicine and in Arts and Science.

Medicine

Commencing September 1, 1969 teaching to medical students in this Department will be virtually all carried out in an 18-week period known as Period IA of the medical course. This has necessitated the planning of a curriculum with considerably fewer hours in each of the anatomical disciplines than we have had in the past. The staff has accepted the challenge and the curriculum is now complete for all practical purposes and ready for inception in September, 1969.

It is expected that the teaching in Gross Anatomy will emphasize discussion groups, clinical applications, and radiological anatomy while continuing to give a fundamental understanding of the structure of the normal human body. The course in Histology will be noteworthy for the introduction of many experimental laboratories which will allow students to develop some familiarity with the different histological techniques. It is also expected that the seminar groups which have proved successful in the past two years will be continued.

Arts and Science

With major changes in the Faculty of Arts and Science, the programme in Biology and Medicine has been greatly altered. Instead of a two-year course in Gross Anatomy and one-year courses in Histology and in Embryology, students will receive a general one-year course in various aspects of Anatomy. This course is now being planned.

A NEW CONCEPT IN POSTGRADUATE, UNDERGRADUATE TEACHING

For many years the Department of Anatomy has relied on full-time graduate teaching fellows or part-time practitioners who come to the Department to participate in the laboratory teaching in Gross Anatomy. In the past year an experimental

approach has been commenced which allows Residents in specialty training (particularly in Orthopaedics and Otolaryngology) to spend full time in the Department for a specific number of weeks while the region of the body of particular interest to them is being examined. These individuals act as Demonstrators and also bring to the students the clinical applications of the knowledge of the regions being studied.

It is hoped, and expected, that this programme will be expanded in future so that all regions of the body will be covered in this way. Preliminary assessments by undergraduate students, postgraduate students and staff indicate that the programme is a successful one and should be continued.

UNDERGRADUATE TEACHING

The undergraduate teaching in the Department involved 1,435 students. The courses which they take are as follows:

Gross Anatomy

42	Biology and Medicine students, second year
36	Biology and Medicine students, third year
124	Dentistry students, first year
50	Dental Hygiene students, first year
168	Medical students, first year
3	joined by Art as Applied to Medicine
2	joined by Rehabilitation Medicine Teacher's Course
107	Rehabilitation Medicine students, first year
110	Rehabilitation Medicine students, second year
14	Speech Pathology and Audiology students
103	Physical and Health Education students, first year
77	joined by Nurses, first year
86	Physical and Health Education students, second year

Histology

32	Biology and Medicine students, third year
168	Medical students, first year
3	joined by Art as Applied to Medicine
120	Rehabilitation Medicine students, first year

Neuroanatomy

175	Medical students, second year
12	joined by Speech Pathology and Audiology students
3	joined by Art as Applied to Medicine students
1,435	*Total in Undergraduate Courses*

GRADUATE TRAINING

The Graduate Department of Anatomy is staffed by some of the individuals who are on the staff of the Undergraduate Department. Members of the Graduate Department conduct research programmes and in the course are able to train graduate students towards higher degrees. During the year the students proceeding towards graduate degrees in the Department included eight seeking Ph.D. degrees and six seeking M.Sc. degrees. One student received her Ph.D. in February, 1969.

The staff in the Department also conducted formal graduate courses which were taken for credit by our own graduate students and by students of other departments and faculties.

Formal Graduate Courses

2	Gross Anatomy
7	Histology
21	Growth, Constitution and Evolution
2	Neuroanatomy
32	*Total in Graduate Courses*

POSTGRADUATE TRAINING

The Department of Anatomy continues to conduct an active programme for graduates in the Health Sciences who are proceeding towards specialist diplomas or towards Certification or Fellowship in the Royal College of Physicians and Surgeons of Canada. The courses given are listed below.

Formal Postgraduate Courses

21	Graduate Dental students
6	Residents in Obstetrics and Gynaecology
17	Residents in Diagnostic Radiology
14	Residents in Anaesthesia
10	Residents in Ophthalmology
10	Residents in Otolaryngology
38	Advanced Course in Surgery
18	Advanced Course in Obstetrics and Gynaecology
134	*Total in Postgraduate Courses*

In addition to the above formal courses the Department supervised advanced training in Anatomy (as indicated previously) to Residents in Otolaryngology and in Orthopaedic Surgery. Five Teaching Fellows in the Department also took a full year to study Gross Anatomy in order to improve their qualifications for Certification or Fellowship or for practice.

STAFF

Last year we reported with regret the illness of Dr. S. H. Bensley; now we must report her retirement from the academic staff of the University of Toronto. Effective July 1, 1969, Dr. Bensley becomes Professor Emeritus. Again, we gratefully acknowledge Dr. Bensley's long association with the Department and her unselfish devotion to it.

We are pleased to report that in September, 1968, Dr. V. I. Kalnins joined the staff as Assistant Professor.

Mrs. P. Rodney was promoted to Lecturer, effective July 1, 1968.

During the 1968–69 academic year, Associate Professor A. M. Jezequel was on leave-of-absence for study in Italy.

It is a pleasure to acknowledge the valuable contribution made to our teaching programme by numerous individuals who devoted part of their time to departmental duties. In all cases their interests in active clinical practice or other aspects of medicine have provided our students with an insight into medicine which they might not have otherwise received.

Staff members hold cross appointments in various departments and institutes including Anthropology, Biomedical Electronics, Dentistry, and the Institute of Medical Science.

RESEARCH

Various staff members have conducted active research programmes in the past year; many of these provide graduate students with material and facilities for their research projects.

Dr. A. A. Axelrad and his associates have continued their investigations into the mechanism of leukemic transformation of hemopoietic cells in mice by Friend Virus. Mrs. W. Brown has shown that three days after infection with this virus, which induces an erythroleukemia, there is a sudden and pronounced decrease in the number of megakaryocytes in the bone marrow and this is followed several days later by a sharp drop in the number of platelets in the peripheral blood. Mr. E. Zeldin and Mr. J. Stephenson have shown that the time of turning on of heme synthesis by hemopoietic cells as a result of Friend Virus infection is closely related to the time

of the megakaryocyte fall. These results, coupled with others from the same laboratory, indicate that the leukemic transformation induced by Friend Virus occurs in pluripotent hemopoietic stem cells (or in their immediate progeny) whose direction of differentiation may be determined by the virus. To facilitate further analysis efforts are now being directed towards the development of a system for cultivating normal hemopoietic cells that will permit both erythroid differentiation and leukemic transformation by Friend Virus to be studied *in vitro*.

After nearly five years of careful selection and back-crossing, Mr. Van der Gaag and Dr. Axelrad have produced two strains of mice which are genetically identical with one another except for a single small chromosome segment bearing the gene locus that determines susceptibility or resistance to Friend Virus. One of these homozygous strains is thus highly susceptible, the other highly resistant to the induction of erythroleukemia. These strains should prove useful in future studies.

Dr. E. G. Bertram conducts research in two areas: (*a*) Recurrent Collaterals in the Cerebral Cortex of Cat and Man, and (*b*) Capillary–Neuronal Relationship in the C.N.S. of Man.

(*a*) A continued study of the recurrent collaterals in the cerebral cortex of cat and man is under investigation in this laboratory. This is a morphological approach, using the Bertram and Ihrig modification of the Golgi technique. The cell bodies and processes of neurons are selectively stained by silver impregnation so that the axons and their collateral branches can be traced within the serially stained sections. The recurrent collaterals within the deeper layers of the cortex are followed to their termination in the more superficial layers. Using this technique, some very interesting and significant findings of the recurrent collaterals in the sensory and motor cortex are now being reported. This morphological finding is of extreme interest to physiologists (especially to Jasper and his team at the Montreal Neurological Institute) who are reporting "feed back" impulses through the recurrent collaterals in the cerebral cortex of the cat.

(*b*) A long term study of the relationship of blood vessels to neurons in the central nervous system in man is under investigation. Suitable brains obtained at autopsy from the Pathology Department as soon after death as possible are perfused by the pulsating perfusion fixation technique (Bertram and Haushalter). Blocks of tissue are removed from the well-fixed brains and stained by a further modification of the Golgi technique which carefully controls the pH of the fixing, chromating, and impregnating solutions. By the use of this method the capillary network and the neurons are simultaneously stained so that their pattern and relationship can be studied. Much work has been done on this in the sensory area and a continuation of the relationship is being studied in the motor area and basal gangliar regions.

Dr. D. H. Cormack has investigated the effect of neuraminidase on the implantation of Walker 256 tumour cells. Incubation with this enzyme releases free sialic acid from the tumour cells, which have a sialomucin layer on their surface. This treatment renders the tumour cells less antigenic in Sprague Dawley rats but does not reduce their viability. Treatment with neuraminidase reduces the number of Walker tumour cells implanting on the peritoneum, indicating that the adhesion of Walker tumour cells to serous membranes depends partly on *N*-acetyl-neuraminic acid at the tumour cell surface.

Dr. J. W. A. Duckworth has conducted research in three areas. (*a*) He has supervised the research of Mr. Bruce Fraser, Graduate Student, who is investigating the development of the parafollicular cells in the human thyroid gland. (*b*) He has investigated the structure, function, and movements of the sacroiliac joint. This work indicated that the sacroiliac joint remains mobile throughout life in the absence of disease in the female, and only fuses late in life in the male. It also indicated that it should not be considered as a single entity but that it is intimately connected functionally with the lumbosacral joints, the symphysis pubis, and the hip joint. (*c*) He has continued his investigations into the development of the bulboventricular loop of the heart in relation to the development of congenital abnormalities in this area.

Dr. A. G. Erwin has continued his work of implanting small amounts of male mammary gland tissue into specially prepared female mice. In the past he used a strain with high mammary tumour incidence and a strain with low mammary incidence. For the present work he is using the same low tumour strain but a different high tumour strain. He is now in the process of comparing the results of these two experiments. In this work grafting is done from a male mouse of each parent strain to hybrids of reciprocal crosses between the two strains.

Dr. V. I. Kalnins and his associates have continued to examine by electron microscopy the morphological aspects of centriole replication during ciliogenesis in the chick tracheal epithelium. It has been found that procentrioles in the earliest stages of development possess a central axial filament. The hypothesis that this filament represents an information-rich macromolecule that could provide for the organization of the fully formed centriole and could programme its assembly is being explored. To facilitate further analysis of centriole replication, a system for inducing cioliogenesis in explants of tracheas in organ cultures has been developed. These organ cultures should prove useful in future studies on the effects of inhibitors of DNA, RNA, and protein synthesis on centriole replication.

Dr. R. G. MacKenzie has continued his research into fields of interest to Otolaryngologists. He has completed an extensive collection of temporal bones showing many anatomical features of importance to Otolaryngological surgeons. With the co-operation of Dr. F. MacIntosh he has also made a special study of the arterial supply of the larynx.

Dr. D. L. McLeod and his associates have developed an *in vitro* plasma culture method for colony-forming units from hemopoietic tissues. This method along with the *in vivo* spleen colony-forming method is being used to study fractions of Friend virus-induced leukemic cell populations separated by sedimentation under unit gravity. These fractions are also being analysed for their cells that stain for hemoglobin, cells that incorporate iron (Fe^{59}), and cells that produce virus.

Dr. C. G. Smith has completed his study of the detailed anatomy of the lacrimal sac region using horizontal sections of human material. A partial report will be published (abstract) in the *American Journal of Ophthalmology* in July.

Dr. J. S. Thompson, using a dietary method of producing atheromata in inbred strains of mice, has continued his research into the effects of the genotype upon the instance of cardiovascular disease. He is currently engaged in studying the incidence of atheromata found after equal periods on the diet in various inbred strains of mice. Dr. A. Roberts, who is proceeding to a Ph.D. degree, is working with Dr. Thompson in this research.

HONOURS

Dr. J. W. A. Duckworth was elected President of the Central Ontario Branch of the Defence Medical Association of Canada.

Dr. J. S. Thompson is one of the four elected faculty members on the Commission studying the government and structure of the University of Toronto.

SCHOLARLY ADDRESSES

Dr. A. A. Axelrad, "Transformation with Friend Virus," University of Florida, May, 1969.

Dr. E. G. Bertram, "The Relationship of Blood Vessels to Neurons in the Central Nervous System of Man," Toronto Neurological Society, Toronto, Osler Hall, November 12, 1968; "The Microcirculation of the Central Nervous System," American Association of Neurological Surgeons, Cleveland, April 13–18, 1969.

Dr. D. H. Cormack, "Effect of Neuraminidase on the Implantation of Walker 256 cells," Twelfth Annual Meeting of the Canadian Federation of Biological Societies, Edmonton, June 13, 1969.

Dr. J. W. A. Duckworth, "The Anatomy and Control of Movement of the Sacroiliac Joints," Second Congress of the International Federation of Manual Medicine, Salzburg, Austria, September 5, 1968; "Lionel Wafer, Surgeon to the Buccaneers," Toronto Medical Historical Society, January 31, 1969.

Dr. A. G. Erwin, "Development of Male Mammary Gland Tissue in Female Mice," American Association of Anatomists, Boston, April 1–4, 1969; "Growth of C57BL/6J Male Mammary Tissue in Genetically Dissimilar Hybrid Female Hosts," Canadian Federation of Biological Sciences, Edmonton, June 11–13, 1969.

Dr. V. I. Kalnins, "Centriole Replication during Ciliogenesis in the Chick Tracheal Epithelium," Eighth Meeting of the American Society for Cell Biology, November 11–13, 1968, Boston, Mass. Abstr. J. Cell Biol. 38: 70a (1968); and at Twelfth Annual Meeting of the Canadian Federation of Biological Societies, Edmonton, Alberta, June 11–13, 1969; "Centriole Replication during Ciliogenesis," Department of Biology, State University of New York, Binghampton, March 28, 1969.

Dr. C. G. Smith, "The Anatomy and Bloodsupply of Visual Pathway," presented to the two-day course in Neuro-ophthalmology, Toronto, April 17 and 18, 1969; "The misnamed medial palpebral ligament in horizontal section," presented at the Annual Research Meeting of Department of Ophthalmology, Toronto, May 10, 1969.

Dr. J. S. Thompson, "Atheromata in inbred strains of mice," Twelfth International Congress of Genetics, Tokyo, August 27, 1968.

PUBLICATIONS

Axelrad, A. A. "A Quantitative Spleen Colony Assay Method for Tumour Cells induced by Friend Leukemia Virus Infection in Mice" (*Cancer Research*, vol. 28, 1968, pp. 2105–14).

——— "Radiosensitivity and Growth of Friend Leukemia Virus studied with the Spleen Focus Assay Method" (*International Journal of Cancer*, vol. 4, 1969, pp. 179–93).

Axelrad, A. A., and Van der Gaag, H. C. "Genetic and Cellular Basis of Susceptibility or Resistance to Friend Leukemia Virus Infection in Mice"; in *Canadian Cancer Conference*, no. 8, pp. 313–43. Toronto: Pergamon Press, 1969.

Erwin, A. G. "Development of Male Mammary Gland Tissue in Female Mice" (*Anatomical Record*, vol. 163, 1969, p. 183) (abstract).

Ham, A. W. *Histology*, 6th Edition. Philadelphia: J. B. Lippincott, 1969. Pp. 1033.

Thompson, J. S. Reviews, *Medical Post*, vol. 4, Dec. 17, 1968, p. 9 (2).

ART AS APPLIED TO MEDICINE

Under the direction of Professor Nancy Joy

The students to graduate in the spring convocation, 1969, number six, an all time record. Three students, including one from Sweden, enrolled in first year in September, 1968. Mrs. Mary (Titus) Murphy, diploma graduate 1956, enrolled in the 1968–69 session as a special student to take a refresher course, preparatory to resuming her professional career. Mrs. Judith Smith and Miss Margot Mackay, diploma graduates, received the B.Sc.A.A.M. at the fall Convocation of the University of Toronto in November, 1968.

Assistant Professor Eila Ross, while remaining on the staff of the University of Toronto's A.A.M. Department, is now working at Sunnybrook Hospital which has become a teaching hospital fully integrated in the University of Toronto's medical teaching programme. Mrs. Ross supervises senior students in the B.Sc.A.A.M. programme who work during part of their course at Sunnybrook. Mr. Alex Wright was appointed an Associate in the Department of Art as Applied to Medicine in September, 1968, and Mr. Jorge Perez Vela was appointed an Assistant Professor in January, 1969. Those appointments carry teaching responsibilities only.

Mr. Donald Forgie, Professor of Library Science, has made the facilities of the Media Centre of the Library School available to staff and students of the Department of Art as Applied to Medicine. Art work specially prepared for studying effects when televised was examined under various lighting and other variable conditions. All coloured papers and boards which are currently used in the service department were arranged according to the TV gray scale for guidance when making coloured graphics to be reproduced on a black and white TV monitor.

DEMONSTRATIONS AND FIELD TRIPS

AMI Convention: Professor Nancy Joy, Miss Margot Mackay and the five third-year students attended the Association of Medical Illustrators' Convention in Chicago, in September, 1968. Dr. and Mrs. Max Samter lent their home to the students for the duration of their visit. The evening sessions on medical films were especially interesting to the students since various aspects of animation were discussed, thus supplementing one of their class projects. The student group visited several galleries and museums, including the Art Institute, Science and Industry Museum, and Museum of Contemporary Art.

Animation: A field trip was made to Sheridan (Community) College in Brampton to visit the Art Department, where the course offered in animation is quite unique in Canada. It is directed by Mr. Martsegis, an animation artist who formerly worked in California where he made a number of medical movies and exhibits to accompany them. The principal of the College, Mr. Porter, explained the purpose of the College and the facilities which it offers to the community and Mr. Firth, the head of the Art Department conducted a tour through the Art and Photography sections.

TV Demonstration: Twelve persons from the AAM Department attended a showing at Ryerson Institute of video tape loops prepared by Dr. N. Swanson, with assistance from staff of the AAM Department, as pilot studies in the use of TV for the medical teaching programme.

Letraset: E. E. Tigert Ltd. arranged an excellent demonstration for the students on the use of Letraset in October, 1968.

Visiting Lecturer: This year Miss Adele Spiegler, freelance medical illustrator and book designer from New York was invited as guest of honour to the Department Open House. Professor Gerald Hodge, Director of the M.A. Degree course in Art as Applied to Medicine at Ann Arbor, Mr. Denis Lee, Assistant Professor, and students in the final year of the course at Ann Arbor also attended. Miss Spiegler conducted a number of seminars with students from both schools and gave a lecture titled "Medical Book Publication," which was attended by staff of both the Faculty of Medicine and the University of Toronto Library.

Mr. Perez Vela gave a demonstration in Anatomical Painting to the Ann Arbor students. This was so popular that local medical artists asked that the demonstration be repeated for their benefit and extended into a refresher course next year.

AAM SERVICE

The volume of work has continued to increase rapidly. Professor Ross was given space at Sunnybrook Hospital in September, 1968, and has supervised the work required there ever since. Miss Margot Mackay and Mrs. Bridget Hough collaborated with a commercial AV company to produce visuals for a pilot video tape on Oxygen Therapy by Dr. Colin Woolf which was produced at Scarborough College. In September, 1968, Mrs. Hough completed drawings for a documentary film by Dr. Wm. Lougheed of the Toronto General Hospital on Microsurgery for Cerebral Aneurism. Mrs. Hough, Miss Mackay, and Mr. Perez Vela completed a series of coloured illustrations, diagrams, and cartoons for an integrated AV lecture series by Dr. Jan Blumenstein which is to be computer assessed by Dr. J. F. Flowers, Director of Medical Education Research.

Mr. Jorge Perez Vela designed a 20-foot exhibit jointly for Dr. Basu of the Department of Ophthalmology and the Eye Bank of Canada. Miss Blackstock prepared an 8-foot display, "Vesico-ureteral Reflux," for Dr. Gerald Cook. After their course ended in May, students of the Department prepared a number of temporary displays for the Canadian Medical Association meeting in June.

Miss Joy and Miss Blackstock completed a 22-minute film on Dizziness for Dr. Hugh Barber. A nine-minute excerpt, entitled "Vestibular Tonus, Clinical Concepts," was made of the animated portion. A careful record has been kept of the development of this film and the Education Officer of the National Film Board and the Director of the Audio Visual Resources of the University Library are assisting in plans for handling its disposition, distribution, and use.

BACTERIOLOGY

Under the Acting Chairmanship of Professor A. E. Franklin

Dr. Marion Ross, Sunnybrook Hospital, who was a part-time staff member in this department for many years, retired in July, 1968. New part-time appointments to the department include Dr. Alice Gray (Women's College Hospital), Dr. Kathleen Givan (New Mount Sinai Hospital), Dr. John Wort and Dr. Peter Middleton (Hospital for Sick Children).

RESEARCH

Dr. R. C. French and Mrs. M. Barrens have continued their studies on "mutual exclusion" between bacteriophages. A report on some of this work appeared in the *Canadian Journal of Microbiology* in January, 1969. It was found that an increase in intracellular deoxyribonuclease correlated with the ability of the cells to exclude superinfecting phage. The effect of the enhanced DNases on appropriate DNA substrates is currently under investigation.

Dr. A. E. Franklin and Dr. D. A. Gordon are continuing their studies relating to possible causative agents in the etiology of rheumatoid arthritis at the Rheumatic Disease Unit of the Wellesley Hospital. Clinical specimens of synovial fluid, synovial fluid supernatants, synovial fluid ultracentrifugates, and tissue homogenates have been tested for cytopathogenic effects in tissue cultures of Earle's L mouse fibroblast cells and the McCoy line of human synovial cells. Although some specimens caused a cytopathic effect in tissue cultures, the effect did not usually persist beyond the third passage. Specimens of systemic lupus erythematosus, psoriasis, and osteoarthritis, under similar conditions, have been negative so far. Haemadsorption studies of inoculated tissue cultures, using human group A, B, and O erythrocytes, as well as guinea pig, chick and rhesus monkey erythrocytes, were also done. Only human erythrocytes indicated a positive haemadsorption phenomenon, but results were erratic and thus difficult to interpret. Bacterial collagenases are known to produce cytopathic effects and attempts were made to determine whether or not cytopathic effects with known bacterial collagenases were similar to the cytopathic effects during serial passage of various rheumatoid arthritis specimens in some tissue cultures. However, the degeneration induced by bacterial collagenase was not like that seen in tissue cultures inoculated with rheumatoid arthritis synovial fluids. For this reason, we do not suspect that the degeneration in our tissue culture cells was caused by a collagenase present in the synovial fluid inoculum similar to the bacterial collagenase used for testing. In addition, almost one hundred specimens of synovial fluid were tested for evidence of diphtheroids, fungi, aerobic and anaerobic bacteria, and mycoplasmas. These cultures have been consistently negative.

Dr. G. H. Hawks, at St. Michael's Hospital, is continuing the study of fluorescent antibody staining as a screening procedure for Mycobacterium tuberculosis.

He is also engaged in a clinical investigation of oxolinic acid in the treatment of acute pyelonephritis and a study of the increase in resistance of strains of Neisseria gonorrheae to penicillins.

Miss Joan Hennessy is investigating methods of eliminating mycoplasmas from tissue culture cell lines. No one method tried has been successful with every line of cells, but to date six cell lines have been freed of mycoplasmas and have remained so for periods up to eighteen months.

Attempts to isolate the agent of cat scratch disease are being carried out in mycoplasma-free cell lines on all specimens of freshly obtained unfrozen and frozen material from patients. Skin test antigen, prepared here, is being used extensively in the diagnosis of cat scratch disease. More than 190 requests for skin test antigen have been received this year, an increase of one-third over last year.

A study is underway on the possible transfer of antibiotic resistance between strains of Staphylococcus aureus, similar to that occurring between enteric bacilli.

Dr. W.–D. Leers, at the Wellesley Hospital, is engaged in a research project involving enteroviruses and applied microbiology.

Dr. J. C. Sinclair and Miss B. K. Buchner, M.A. are continuing to study infectious hepatitis in collaboration with Professor Deinhardt, Chairman, Department of Microbiology, Presbyterian-St. Luke's Hospital, Chicago. Drs. Deinhardt and Holmes have reported that the marmoset may be a possible experimental host for human viral hepatitis.

HONOURS

Dr. I. B. R. Duncan has been elected a Vice-President of the Canadian Society of Microbiologists.

SCHOLARLY ADDRESSES

Dr. I. B. R. Duncan, "Gram-negative Infections in a General Hospital," to a Symposium on Gram-negative Infections organized by the Society of Microbiology of the Province of Quebec, Montreal, April 17, 1969.

Dr. A. E. Franklin, "Serological Diagnosis of Rubella Infection in Pregnancy," presented at the Regional Meeting of the Royal College of Physicians and Surgeons, Windsor, Ontario, November, 1968.

Dr. W.-D. Leers, "Action of Chloroform on the Hemagglutinin of Echovirus Types 7 and 11," presented at the Laboratory Section Meeting, Canadian Public Health Association, Seigniory Club, Montebello, Quebec, November, 1968.

W.-D. Leers, K. Arthurs, R. Volpe, and T. C. Brown, "An Unusual Case of Suppurative Thyroiditis caused by Actinomyces Naeslundi," presented at the 18th annual meeting of the Canadian Society of Microbiologists, University of Windsor, Windsor, Ontario, June, 1968.

R. Y.-S. Shi, F. M. Hill, and Alice E. Gray, "Antibody Responses and Recurrent Infections in Patients with *Escherichia coli Bacteriuria*," presented at the Laboratory Section Meeting, Canadian Public Health Association Meeting, Seigniory Club, Montebello, Quebec, November, 1968.

PUBLICATIONS

Anglin, C. S., and Franklin, A. E. "An Adverse Reaction from Treating Warts with Vaccinia Virus" (*Canadian Medical Association Journal*, vol. 99, no. 3, July 20, 1968, p. 122).

Buchner, B. K., and Sinclair, J. C. "Studies to Identify Tissue Culture Isolation from Patients with Infectious Hepatitis" (*Canadian Journal of Public Health*, vol. 59, Oct. 1968, pp. 399–404).

Duncan, I. B. R. "Antibodies to Echovirus Type 30 in the Canadian Population" (*Canadian Medical Association Journal*, vol. 99, no. 16, Oct. 26, 1968, pp. 786–90).

——— "A Comparative Study of 63 Strains of ECHO Virus Type 30" (*Archiv für die Gesamte Virusforschung*, vol. 25, no. 93, 1968).
——— "Development of Lincomycin Resistance by Staphylococci"; in *Antimicrobial Agents and Chemotherapy – 1967*, p. 723, 1968.
——— "The Diagnostic Virology Laboratory" (*Canadian Family Physician*, vol. 14, no. 10, 1968, p. 61).
FRENCH, R. C., and BARRENS, M. "The Effect of Superinfection by T4r+ Coliphage on the Deoxyribonucleases of Induced Escherichia coli Y10 (λ)" (*Canadian Journal of Microbiology*, vol. 15, no. 1, Jan. 1969, pp. 9–13).
GIVAN, K., and JÉZÉQUEL, A. M. "Infectious Canine Hepatitis: A Virologic and Ultrastructural Study" (*Laboratory Investigation*, vol. 20, no. 1, Jan. 1969, pp. 36–45).
GOLDNER, M., GLASS, D. G., and FLEMING, P. C. "Characteristics of Aerobacter beta-lactamase" (*Canadian Journal of Microbiology*, vol. 14, no. 2, Feb. 1968, pp. 139–45).
——— "Spontaneous Mutant with Loss of B-lactamase in Aerobacter cloacae" (*Journal of Bacteriology*, vol. 97, 1969, p. 961).
TURNER, J. A. P., BURCHAK, E. C., BANNATYNE, R. M., and FLEMING, P. C. "The Protean Manifestations of Mycoplasma Infections in Childhood" (*Canadian Medical Association Journal*, vol. 99, no. 13, Oct. 5, 1968, pp. 633–7).

BANTING AND BEST DEPARTMENT OF MEDICAL RESEARCH

Under the direction of Professor I. B. Fritz

GENERAL ADMINISTRATIVE REORGANIZATION

This year has marked a period of remarkable transition in the Banting and Best Department of Medical Research. Following the appointment of Dr. Irving B. Fritz as Chairman, several new staff members joined the department: Associate Professors Clelia Ganoza-Becker, Alan Goodridge, and David MacLennan; Assistant Professor Francis Rolleston; and Research Associate Leo Lee.

Simultaneously, the utilization of space and facilities in the Best Institute was reorganized, and the administrative structure was modified. Beginning in September, 1968, staff members of the Physiology Department began to move their laboratories to the Medical Sciences Building. By May, 1969, the move was completed, with the exception of certain communal facilities which continue to be employed by both the Physiology Department and BBDMR in the Best Institute. Mr. Keith Bowler, the former administrative co-ordinator for the Best Institute, accepted a new position in the Medical Sciences Building, and Mr. Edward Wood was appointed as Mr. Bowler's replacement. Concomitant with this shift, plans were prepared to construct a new division—the Best Institute Recoverable Services—which was designed to accommodate the new changes required to allow the Best Institute to be used primarily by the developing programmes of BBDMR. This replaces the former "Central Services" unit. By January, 1969, the Division of Laboratory Animal Science had assumed responsibility for all animal procurement and maintenance, thereby removing a large portion of the personnel formerly associated with the "Central Services Unit."

RENOVATIONS OF THE BEST INSTITUTE LABORATORIES AND COMMUNAL FACILITIES

As new staff members arrived, they occupied laboratories vacated by departing members of the Physiology Department. This required a sort of game of "musical laboratories" during the early months, until the resettling process could be completed. The reshuffling of laboratory space required unfortunately interrupted several researchers' laboratory operations.

The labs vacated by the Physiology Department required renovations. Minimally, only painting was necessary, but most often new laboratory bench tops and repairs

to plumbing and flooring were required even without the rearrangement of existing facilities. In one laboratory the renovations were relatively extensive. Unfortunately, because University funds were restricted, almost all renovation costs had to be borne by special funds available to the BBDMR. In addition, communal facilities were in great need of repair and revision to accommodate the research demands of the new staff members.

Accordingly, the distilled water problem was tackled first. New ion exchange columns have been installed, and preparations are well under way for a communal glass washing facility in the sub-basement. This facility will also have a large distilling unit, a reservoir, automatic glass washers, and an autoclave. Adjacent to this room a bacterial preparations room is being prepared for the growth and harvesting of bacteria so that the nearby autoclave can be conveniently employed. On each floor, suitable rooms have been allocated for the use of communal facilities, including scintillation spectrometers, ultracentrifuges, and cold rooms. The relocation of the photographic services section to the sub-basement was accomplished.

RECRUITING AND SEMINAR PROGRAMMES—RESEARCH SUPPORT ACQUISITION

An active recruiting programme has been sustained. During 1968–69, a seminar programme was initiated which served to inform staff members of the researches being done by the BBDMR staff and by staff from other departments with related interests. This seminar programme also included several outside speakers, many of whom were under evaluation as potential candidates. During this time, Dr. James Felts was offered a position as Professor, and a Negotiated Development Award from the MRC was successfully completed to allow Dr. Felts to begin his researches here in September, 1969. Similarly, Dr. Bernard Schimmer was recruited; and he, also, will take up his duties as Assistant Professor in September, 1969. Negotiations are in progress to replace other staff members who are scheduled to retire on June 30, 1969 (Professors Baer, Franks, and Lucas).

All new staff members were successful in their efforts to obtain sufficient research support from various granting agencies to permit them to equip their laboratories and begin their research programmes. On behalf of the department, an MRC request from the chairman for a block equipment grant was awarded. This allowed the purchase of several centrifuges and a scintillation spectrophotometer. In addition, an MRC Associate award was granted to Dr. Clelia Ganoza-Becker, and MRC Scholar awards were granted to Drs. David MacLennan and Francis Rolleston, effective July 1, 1969.

PROPOSAL FOR A PROGRAMME IN METABOLIC CONTROL

Interactions among staff members have been encouraged by regular staff meetings and seminars. Among activities performed, a major effort has been devoted to the preparation of a proposal for a programme in "Metabolic Control" designed to train doctoral and postdoctoral students in this area. The discussions leading to this proposal were invaluable in fostering interactions among staff members and in helping to define likely directions for BBDMR. Courses in the "Principles of Metabolic Control" are being prepared for possible presentation in the 1969–70 academic year. Several postdoctoral students have been accepted by various staff members of BBDMR, and it is anticipated that this portion of the programme is ready for an orderly growth.

Lectures and other forms of participation in the regular teaching programmes at the University of Toronto were contributed by nearly all BBDMR staff members to some extent, and Drs. Fritz, Kuksis, Logothetopoulos, Mookerjea, Wrenshall, and Yip each contributed to various courses offered by the Physiology Department or the Biochemistry Department and/or to the research training of students from these departments.

RESEARCH

In the Subdepartment of Synthetic Chemistry in Relation to Medical Research, the synthesis of phospholipids and phosphonolipids of biological interest was continued by Professor E. Baer and his colleagues, Dr. H. Basu (dihydroxypropylphosphonic acid and phosphonic acid analogues of phosphatidic acids), Dr. D. J. Nazir (investigation of the enzymatic oxidation of dihydroxypropylphosphonic acid), Dr. G. R. Sarma (synthesis of naturally occurring ceramide aminoethylphosphonates), Dr. R. Robinson (phosphonic acid analogues of carbohydrate metabolites: glyceraldehyde-3-phosphate, dihydroxyacetone-phosphate, and glyceric acid-3-phosphate), and Dr. S. K. Pavanaram (synthesis of phosphonic acid analogues of L-α-(N-methyl)cephalins. Mr. H. H. Flehmig, in addition to ably assisting the staff of the subdepartment, carried out measurements of the energy content of stereoisomers of asymmetrically substituted glycerol derivatives.

Dr. D. Buchnea has continued his study of the mechanisms of acyl migration in partially acylated glycerides and glyceride-glycerol ethers, and in co-operation with Professor A. F. Peerdeman and his co-workers from the Laboratorium voor Kristalchemie der Rijksuniversiteit, Utrecht, the Netherlands, is studying the differences between the physical and chemical properties of optically active isomers of glycerol derivatives.

The following projects are being pursued. (*a*) The work on attempts to develop a host-cancer resistant radiation-chimera has been continued in Dr. W. R. Franks's lab, with the assistance of Miss M. M. Shaw, Mrs. T. von Ramm, and Mr. G. A. Meek. The present approach consists of attempts to depress the host anti-(tumour-immune) graft reaction by dietary means, notably pantothenic acid deficiency. A supply of the pantothenate inhibitor omega methyl pantothenate has kindly been synthesized for us by Hoffmann-La Roche Co. and it is planned to use this to produce an acute, reversible host tolerance to the tumour-immune graft in the radiation chimera. (*b*) In addition, the investigation of the value of the post-mortem lactate profile in assessing the ante-mortem state in fatal (aircraft) accidents has been continued. This work is being reported at the meeting of the Joint Committee on Aviation Pathology, Halton, England. An acute myocardial failure in flight has apparently been differentiated by this method. (*c*) Mr. Meek has continued work on ballistics of the arm under varying accelerations. Error incidence for a test varied greatly between subjects, but on repetition, individual error was lower by approximately 25 per cent. The results of 6,000 reaction times have not yet been calculated. Planned improved apparatus would help to obtain this information quickly.

Dr. Irving B. Fritz set up his laboratory in Rooms 411 and 407 and all necessary equipment was purchased. Work was begun on the following problem areas: (*a*) reconstruction of parts of the gluconeogenesis pathway. The controls responsible for influencing the cycling of phosphoenolpyruvate to pyruvate are being investigated primarily by Dr. Leo Lee. The following three enzymes have been obtained from pork liver in a highly purified state: pyruvate carboxylase; PEP carboxykinase; and pyruvate kinase. The effects of various concentrations of co-factors and compounds associated with fatty acid oxidation are being investigated. (*b*) The action of insulin covalently bound to G-100 sephadex on the metabolism of isolated adipose tissue cells is being investigated by Drs. J. Vavrik and J. Mayerle, with the collaboration of Dr. C. C. Yip. These studies were designed to investigate the site of action of insulin and to develop an approach to isolating the insulin receptor. (*c*) Dr. John Brosnan has been investigating the distribution of fatty acyl CoA dehydrogenase in rat liver mitochondria and the functional relation of carnitine palmityltransferase to this enzyme. The localization of the enzymes on the submitochondrial particle lacking the outer membrane has been confirmed, and methods have been worked out for following fatty acyl CoA dehydrogenase activity in the submitochondrial particles. These studies are designed to investigate the mechanism of acyl group

translocation across mitochondrial membranes. (*d*) Additional work has been done on carnitine palmityltransferase. Evidence for an intermediary chain-length fatty acyl CoA-carnitinetransferase has been obtained. This work was initiated by Mr. Roy Baker and is being continued by Mrs. Bozena Kopec.

Since joining the department in September, 1968, Dr. M. C. Ganoza-Becker and her laboratory staff have continued to investigate the mechanisms of initiation, propagation, and termination of protein synthesis on ribosomes. In the past few months, exclusive attention has been paid to the mechanism of polypeptide chain termination. Previous findings indicate that this process requires the participation of special triplets on messenger RNA, as well as special proteins which elicited the release of completed polypeptides from ribosomal precursors. Progress in this area depended upon devising appropriate assays to examine the ability of various components to recognize the termination triplets, and also to devise a way in which protein chain cleavage can be detected independently of triplet recognition. Both these assays required the use of certain purified special transfer RNA's, messenger RNA's of defined sequence, and mutants of RNA phage defective in chain termination. With the appropriate use of chemical and genetic tools, all of these components have been prepared and considerable progress has been made towards the purification of the transfer RNA's and the proteins needed for a study of the underlying mechanisms. Experiments *in vivo* suggest that ribosomes dissociate into subunits prior to chain initiation. It is essential to learn whether this results from chain termination or if some other biochemical event regulates translation at that level. The question asked, therefore, was whether subunit dissociation forms an integral part of the mechanism of chain termination. In approaching this problem, methods were modified for the separation of "heavy" and "light" ribosomes, and for the separation of an active synthetic cell-free system capable of intragenic translation.

Dr. A. G. Goodridge has been studying the physiological and biochemical basis for the dramatic increase in hepatic fat synthesis which occurs when unfed, newly hatched chicks are given a meal high in carbohydrate. The results indicate that glucose is the specific dietary component which stimulates fat synthesis. Glucose does not appear to directly stimulate the metabolic pathway. The nature of the intermediate between dietary glucose and the effect on liver cells is being investigated. A second major concern has been the location of those specific enzymatic steps in the metabolic pathway between glucose and fat which are stimulated. The results show that the principal effects are exerted on the glycolytic pathway (between glucose and pyruvate). Two distinct enzymatic steps appear to be effected. An increase at one control point accelerates the production of acetyl coenzyme A, the substrate for fatty acid synthesis. Activation of the incorporation of acetyl coenzyme A into fatty acids appears to be the consequence of increased activity at the other control point. The specific enzymes involved at each control point and the mechanism of activation of the incorporation of acetyl coenzyme A into fatty acids have been and continue to be the principal areas of ongoing research. Studies on the regulation of the synthesis of malic enzyme, an enzyme involved in fat synthesis also are being carried out. Initial work has involved purification of the enzyme.

In Dr. A. A. Horner's laboratory, a heparin-peptide complex of very high molecular weight has been isolated from rat skin and is being characterized. It is resistant to proteolytic digestion but is depolymerized by ascorbic acid under very mild conditions. A study of the possible physiological significance of the ascorbic acid reaction has been continued. In view of the unexpectedly large species and tissue differences in heparin structure recently observed in this laboratory, a project to characterize heparin from human tissues has been in progress.

Dr. A. Kuksis has continued studies on the structure and metabolism of complex natural lipids by means of integrated chromatographic and enzymic methods. Specific applications of the combined techniques were made in following changes in glyceride and phosphoglyceride structure during active fat absorption and milk secre-

tion in several animal species (in collaboration with W. C. Breckenridge, L. Marai, and B. J. Holub). A significant improvement in the direct gas chromatographic analysis of plasma lipids was made by controlled predigestion of the total lipid extracts with specific enzymes prior to the analysis. The study of the metabolism of plant sterols by rat liver was extended to the identification of the oxidation products and to the assessment of the effect of plant sterols upon the biosynthesis and degradation of cholesterol by subcellular fractions (in collaboration with M. T. Subbiah). The technique of thin-layer chromatography was successfully adapted to the resolution of plasma and egg yolk lipoproteins on hydroxylapatite (in collaboration with D. A. Gornall).

The following research activities have been or are being carried out in Dr. J. Logothetopoulos's section: (*a*) autoradiographic studies on islet cell regeneration in the alloxan and streptozotocin diabetic mouse; (*b*) localization of proinsulin in beta cells using fluorescein or peroxidase labelled specific antibody; (*c*) a functional and morphological study in a genetically determined diabetic syndrome in an inbred line of guinea pigs; (*d*) studies on disposal of chylomicrons and ketogenesis in insulin antibody injected and chronically alloxan diabetic rats (in collaboration with Dr. Suzette Stuart).

Professor C. C. Lucas, retiring this year, undertook few new experimental studies, but finished several earlier incomplete ones. With Mr. Bruce Holub he completed a study of the material containing organically bound phosphorus precipitated from lipid solutions by magnesium chloride; it is mainly monoaminophospholipid. He devoted some time to collecting historical data relating to this department, with which he has been associated for forty-two of its forty-six years.

Research being carried out in Dr. D. H. MacLennan's lab is concerned with the resolution and reconstitution of membranous enzymes which carry out ion transport. Vesicular fragments of the sarcoplasmic reticulum are being isolated in a form in which calcium transport is tightly coupled to ATP hydrolysis. Factors concerned with the coupling of these two functions are being investigated, and, consequently, experiments are designed to establish a system in which the energizing function (ATP hydrolysis) can be reversibly uncoupled from the transport function. In addition, studies on the function of subunit proteins in the complex ATPase systems of both the sarcoplasmic reticulum and the mitochondrion are being carried out.

In Dr. S. S. Mookerjea's laboratory, investigation was continued in the plasma lipoprotein synthesis in intact animals and in isolated perfused liver system. (*a*) Incorporation of radioactive glucosamine into plasma low-density lipoproteins is impaired in early choline deficiency, thus suggesting an interference of synthesis or release of carbohydrate-protein-lipid complex. (*b*) With Dr. C. E. Park, a comprehensive analytical study of the lipid and protein composition of plasma lipoproteins in rats has been completed. A search for specific alteration of lipoprotein composition by dietary changes yielded results showing a striking correlation of decrease or increase of all lipid components and protein in only low-density lipoprotein fraction in response to dietary choline status. (*c*) Work on the mechanism of development of fatty liver due to orotic acid feeding has been initiated with Mr. D. S. Field. (*d*) In collaboration with Dr. W. Thompson of the Department of Biochemistry, a study has been completed on the phosphorylcholine and lecithin metabolism in choline deficient rats. The results obtained indicate that the status of phosphorylcholine metabolism in liver is of considerable interest in understanding the lipotropic action of choline.

Work has been started in Dr. F. S. Rolleston's laboratory on the mechanisms controlling the release of lipoproteins from the perfused rat liver. The prime emphasis this year has been in setting up the perfused liver preparation and determining its viability. The system chosen uses a perfusing medium of bovine serum albumen and bovine erythrocytes in physiological saline which is equilibrated with oxygen in a Silastic tubing lung. The heterologous perfusion medium is chosen to permit

immunochemical isolation of proteins released into the perfusion medium from the liver. Criteria of viability include gluconeogenesis from suitable precursors, retention of glycogen, and production of bile.

Dr. Bruno Rosenfeld has explored the effects of the nature of dietary carbohydrates on the level of hepatic long-chain fatty acid synthetase, a key enzyme operative in lipogenesis. When cornstarch as a source of carbohydrate in a complete diet was replaced by sucrose, and the diet fed to rats, both the specific activity of the long-chain fatty acid synthetase and the amount of enzyme per liver increased several fold, in parallel with the triglyceride of the hepatic liposomal fraction. Fructose in place of sucrose in the same semi-synthetic diet showed the same effects both on the enzyme and on hepatic liposomes. Glucose, in contrast, did not produce an increase of the fatty acid synthetase, or liposomes in the liver, comparable to that of fructose or sucrose. It was concluded that the effect of dietary sucrose on the stimulation of long-chain fatty acid synthetase and liposome formation is due to its fructose moiety.

Under study in Dr. G. A. Wrenshall's laboratory are: (*a*) Effects of prolonged fasting, in initially obese non-diabetic grown dogs, on the tracer-determined rates of production and oxidation to CO_2 of plasma glucose. The concurrent rate of nitrogen excretion into the urine *plus* feces also is measured; (*b*) With Dr. M. Vranic, tracer-determined effects of diabetic control on glucose accumulation are being studied before, during and after running. These determinations are made first in the normal dog, then following partial (non-diabetogenic) pancreatectomy, and finally in the same dog after total pancreatectomy while on an infusion of insulin sufficient to normalize the plasma glucose level during initial rest. Effects of delayed and immediate insulin infusion, of recycling of C^{14} into the plasma tracer glucose (C^{14}-glucose) and on plasma free fatty acid levels are being measured; (*c*) As her research project toward the degree of M.Sc. in physiology, Miss Marion Bicknese is determining the rate of oxidative transfer of the hydrogen of body fats and proteins to metabolic water in the long-fasting dog. Four experiments are completed, and a fifth is scheduled.

Research carried out in Dr. C. C. Yip's laboratory may be summarized as follows: (*a*) The biosynthesis of insulin has been shown to proceed through the initial synthesis of a single-chain polypeptide proinsulin via an intermediate which is composed of the normal A chain of insulin and an elongated B chain having the additional amino acid residues attached to its carboxyl terminal. The amino acid compositions of the precursor and the intermediate were determined. A specific anti-proinsulin anti-serum was obtained which has been used to demonstrate the presence of proinsulin in the pancreatic β cells by immunoassays. Experiments are under way to study the physiological role of the single-chain proinsulin and of the intermediate. (*b*) C^{14}-methyl-DANSyl-vovine thyrotrophic hormone (C^{14}-DANS-TSH) has been prepared by dansylation of TSH which had been further purified in this laboratory. The C^{14}-DANS-TSH retains biological activity and is being used to study the specific binding of this hormone by thyroid tissues.

HONOURS

Professor Emeritus C. H. Best was reappointed member of The Scientific Advisory Committee of the Research Institute, Hospital for Sick Children, Toronto; a Festschrift for Dr. Best which appeared in the *Canadian Journal of Physiology and Pharmacology*, vol. 46, no. 3, May, 1968, was dedicated to him on his retirement from the University of Toronto and all articles were contributed by his colleagues and pupils.

Dr. I. B. Fritz was elected to the membership of the Canadian Biochemical Society.

Dr. J. Logothetopoulos was appointed Associate Editor of the *Canadian Journal of Physiology and Pharmacology.*

Dr. C. C. Lucas held the position of Rapporteur in the Microbiology and Biochemistry Subject Division, Science Section (III), Royal Society of Canada; and is a member of the Committee on Schools of Medicine of International Union of Nutritional Sciences.

Dr. D. H. MacLennan was elected to membership in the Canadian Biochemical Society.

Dr. S. S. Mookerjea was elected to the membership of the Biochemical Society, United Kingdom.

Dr. C. C. Yip was elected Vice-President (1969–70) of the Toronto Diabetes Association.

SCHOLARLY ADDRESSES

Professor C. H. Best, "The Future of Insulin," to the Annual Meeting of the American Diabetes Association, San Francisco, California; "Advances in the Therapy of Diabetes," to the Tennessee Valley Medical Assembly, Chattanooga, Tennessee; "Paramedical Aspects of Diabetes," to the American Diabetes Association: Paramedical Postgraduate Course in Diabetes; "The Stimulation of Medical Research," to the Conference on Proinsulin, Indianapolis, Indiana.

Professor I. B. Fritz, "On the Role of Carnitine in Fatty Acid Metabolism," to the Research Institute, the Hospital for Sick Children, Toronto; "The Role of Carnitine in the Control of Fatty Acid Metabolism," to the Symposium on Fatty Acid Metabolism, Brandeis University, Waltham, Massachusetts.

Professor M. C. Ganoza, "Studies on the Mechanisms of Polypeptide Chain Termination," to the Department of Biochemistry, McMaster University, Hamilton; "Synthesis on Specific Proteins by Mammalian Cells" (co-author), to the Rockefeller University, New York; "Studies on the Completion of Polypeptides," to the Biochemistry and Biophysical Society of Toronto.

Professor A. G. Goodridge, "Development of Lipogenesis in the Chick," delivered at the Eli Lilly and Co. Research Laboratories, Indianapolis, Indiana; "Induction of Lipogenesis in Chick Liver," to the Federation of American Societies of Experimental Biology, Atlantic City, New Jersey.

Professor A. A. Horner, "Macromolecular Heparin," to the nato Advanced Study Institute, Santa Margherita, Italy.

Professor A. Kuksis, "Plasma Lipids of Young Adults on Controlled Experimental Diets" (co-author), and "Gas-liquid Radiochromatography of Intact Natural Triglycerides" (co-author), to the Joint Meeting of the American Oil Chemists' Society and the American Association of Cereal Chemists, Washington, D.C.; "Studies on the Structure of Milk Fat Triglycerides of Different Mammalian Species" (co-author), and "Glyceride Structure of the Mucosal Lipids of Rat Intestine during Active Triglyceride Synthesis" (co-author), to the American Oil Chemists' Society, New York, N.Y.; "Bile Acids" to the American Oil Chemists' Society Short Course on Quantitative Analysis of Lipids by Gas Chromatography, Pocono Manor Inn, Pocono Manor, Pennsylvania.

Professor J. Logothetopoulos, "Islet Cell Proliferation in Experimental and Genetic Diabetes," to the 2nd Wenner-Gren International Symposium on the Structure and Metabolism of the Pancreatic Islets, Unea, Sweden; "Structural Aspects of Proinsulin and Insulin Biosynthesis and Transport," to the 14th Eli Lilly Symposium on Insulin, Indianapolis, Indiana.

Professor D. H. MacLennan, "Resolution of the Subunit Proteins of the Oligomycin-sensitive ATPase Complex" to the Annual Meeting of the American Societies for Experimental Biology, Atlantic City, New Jersey.

Professor S. S. Mookerjea, "Mechanism of Development of Fatty Liver," to the Department of Pathology, University of Toronto.

Dr. C. E. Park, "Plasma Lipoprotein Composition in Choline Deficiency," to the Federation of American Societies for Experimental Biology, Atlantic City, New Jersey.

Professor G. A. Wrenshall, "Rates of C^{12}-glucose Production and Nitrogen Excretion During Prolonged Fasting in Grown Dogs," to the Toronto Diabetes Association.

Professor C. C. Yip, "Biosynthesis of Proinsulin and Insulin," to the Canadian Diabetes Workshop; "Proinsulin and Insulin in Fetal Bovine Pancreatic Slices," to the 14th Eli Lilly Symposium on Insulin, Indianapolis, Indiana.

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Baer, E., and Flehmig, H. H. "Refutation of Alleged Differences in the Energy Contents of Optical Isomers" (*Canadian Journal of Biochemistry*, vol. 47, 1968, pp. 79–83).

Baer, E. (with Robinson, R.) "Phosphonolipids XVII. Synthesis of Ethylene Glycolphosphonic Acid Analogues of Lecithins" (*Canadian Journal of Biochemistry*, vol. 46, 1968, pp. 1273–8).

Baer, E., and Sarma, G. R. "Phosphonolipids XIX. Synthesis of a Naturally Occurring Ceramide Aminoethylphosphonate and its Enantiomer" (*Canadian Journal of Biochemistry*, vol. 47, 1969, pp. 224–5).

——— "Phosphonolipids XX. Total Synthesis of a Naturally Occurring Ceramide Aminoethylphosphonate and its Enantiomer" (*ibid.*, June 1969, pp. 603–10).

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BEHAVIOURAL SCIENCE

Under the direction of Professor R. F. Badgley

OVERVIEW

Although the momentum for the teaching of behavioural science in faculties of medicine has been gaining universally, most programmes have been limited to relatively minor contributions made under the auspices of traditional medical departments. In Britain and the United States there are now four or five autonomous departments of behavioural science (or their equivalent); in Canada, only one such programme currently exists, that at the University of Sherbrooke which represents a blend of social medicine and social science.

When the decision was made to initiate an autonomous programme in Behavioural Science in the Faculty of Medicine at the University of Toronto in 1968, it was decided that a year would be allowed for the recruitment of the teaching staff, the planning and development of a curriculum, the establishment of liaison within the Faculty, the University, and the community, and the initiation of relevant research projects. It is to a review of some of these activities, which have been our primary concern during 1968–69, that this report is directed.

Staff

A nucleus of four staff members has constituted the group during 1968–69. This group has been augmented by three research assistants.

Contacts were initiated with numerous university departments in Canada, Great Britain, and the United States in the search for potential candidates. Approximately 20 such potential candidates were interviewed from the immediate vicinity; an additional six were invited to visit the university from elsewhere.

Effective July 1, 1969, the staff will consist of six members and negotiations are under way and near completion with two other candidates. It is anticipated that by September 1, 1969, when the programme is introduced, there will be a combination of ten full-time and part-time teachers. Their professional backgrounds will represent sociology, psychology, and other fields.

Curriculum

Because there is a paucity of relevant teaching models in behavioural science, our initial efforts were devoted to a consideration of the most effective way of introducing such a programme, as well as a critical review of existing programmes elsewhere. The syllabi of 15 to 20 programmes were reviewed and visits were paid by members of the staff to observe programmes at the University of Kentucky, McGill University, Harvard University, Tufts University, University of British Columbia, Berkeley campus of the California system, and the University of Washington.

The development of the curriculum has involved extensive joint planning with various members of the Faculty of Medicine, related Departments of Sociology and Psychology, and members of the medical staff of the teaching hospitals. Individuals from these programmes have participated in discussions revolving around the development of the curriculum. Throughout the year there has been a total of 48 meetings dealing with curriculum planning, each approximately of 3 or more hours.

The Behavioural Science Curriculum Committee for Period 1 has met on several occasions, and in view of the planning and development which has taken place, it is proposed to re-constitute the Committee and establish an advisory committee. The former Committee will consist of those directly involved in the teaching of the programme and related systems, while the latter will insure continuous appraisal by a more widely based group of specialists.

The curriculum has also been reviewed singly or collectively with approximately

two dozen medical students currently enrolled in the Faculty of Medicine. This has proven to be a useful if not indispensable source of counsel.

Integration and Co-ordination

Inherent in establishing the new programme of Behavioural Science has been the recognition that the programme should be co-ordinated with the teaching in other systems and integrated as actively as possible with relevant interests in the community. During the year, literally hundreds of contacts have been made within the university, the city, the province, and indeed the whole of Canada. Excluding visits with members of the University, discussions, for example, have been held with members of: Ontario Department of Health; Toronto Social Planning Council; Canadian Mental Health Association; Canadian Public Health Association; Ontario Mental Health Foundation; Family Practice Teaching Units at general hospitals in the community; Alcoholism and Drug Addiction Research Foundation; Association of Canadian Medical Colleges; Canadian Nurses' Association; Victorian Order of Nurses; and the Ontario Medical Association.

One result of this attempt towards integration has been the appointment of several part-time teaching staff members. At the present time three members of the staff have cross-appointments in the Department of Sociology, and of those who are in the process of being appointed two will have cross-appointments in the Department of Psychology, one at the Clarke Institute of Psychiatry, and another at the Toronto General Hospital.

Another by-product has been two proposed research programmes. One research proposal has been jointly submitted by the Faculty of Medicine, the School of Nursing, the Family Practice Teaching Unit at the Toronto Western Hospital, and Behavioural Science. The second project would involve research with members of the Departments of Anthropology, Paediatrics, and Behavioural Science.

Service Activities

Members of Behavioural Science have served either as consultants, advisers, or committee members to a large number of programmes or agencies within Canada and the United States. These activities have ranged from consulting with family doctors in the development of research proposals to serving as consultants to government or international agencies. These have variously included: consultation about the development of a curriculum at Innis College; the social work programme at the Toronto General Hospital; Medical Sociology Section of the American Sociological Association; the Ontario Council of Health, the Ontario Medical Association; Canadian Mental Health Association; Ontario Mental Health Foundation; Canadian Public Health Association; Pan American World Health Organization (World Health Organization); the Social Security Administration and the National Centre for Health Services Research and Development; and the National Institute of Child Health and Human Development of the U.S. Public Health Service; and others.

In addition to these activities, the staff has served on numerous occasions as consultants to programmes involving research relevant to social science. For example, discussions have been held with various physicians in the community about a number of proposed research projects. Advice has been sought (undoubtedly prematurely) on the teaching of behavioural science from several universities within both Canada and the United States. These requests have come from as diverse sources as Memorial University of St. John's, Newfoundland, Harvard University, the University of Michigan, and the University of Alberta in Edmonton.

Research Activities

The current staff of Behavioural Science, prior to July, 1968, had in process four major studies. These are summarized in the later section dealing with research and will result in the probable publication of four books in 1970 (Kelner, Kemper and Badgley).

In addition to these studies which are nearing completion, two new programmes have been started and two additional ones are awaiting grant approval.

Unlike Great Britain or the United States, there is in Canada a dearth of community surveys relating to various aspects of health and its social implications. In August 1968, discussions with members of the Ontario Department of Health subsequently led to a contract (the first of its kind initiated by that Department) to undertake a study of the Health of Yorkville, essentially a community study of the health of adolescents.

A second and quite different undertaking has been the convening of a national Workshop on Social Science and Health in Canada. This workshop was initiated because no professional forum exists to serve as an appropriate meeting place for social scientists and physicians who are interested in this area. With assistance from the Ontario Mental Health Foundation, an informal planning group developed an agenda for the Workshop which was held on June 3–4, 1969, in Toronto. The workshop dealt with an overview of research in the field, a review of three current teaching programmes in behavioural science, and an examination of current funding practices in this area. The conference was attended by over 70 individuals from across the country. Social scientists, teaching physicians, representatives from the Medical Research Council, the National Department of Health and Welfare, the Ontario Department of Public Health, and the Laidlaw Foundation were among those participating. The planning and execution of the conference depended heavily on the skills of Mr. Ian Sone, M.A., who was temporarily attached to Behavioural Science.

Two research proposals (which are now being reviewed) would initiate an integrated series of studies around a large general hospital in Toronto (Toronto Western Hospital) and in northern Ontario at Sioux Lookout in co-ordination with the Departments of Paediatrics and Anthropology. Both of these research proposals are ventures into areas which hitherto have not been studied in Canada and would establish, along with the Health of Yorkville study, three community laboratories for Behavioural Science.

Visitors

Perhaps because of the novelty of the programme or the central location of the university, numerous visitors (approximately 3 dozen) from various parts of Canada and the United States have paid visits of from one to three days. While these visits provide an internal catalytic effect and have served as a basis for comparison and liaison with other programmes, they have required time and co-ordination.

Summary

Many activities, whose impact and end product will only become apparent in later years, have been undertaken or initiated during 1968-69. A nucleus of staff has been established, a provisional curriculum (undoubtedly to be modified in the future) prepared, and several research programmes initiated.

Future needs of Behavioural Science will revolve around: (1) the careful evaluation of the curriculum, (2) a clearer specification of the number and type of appropriate staff, and (3) increased co-ordination among specialists within the programme and between these and other members of the faculty and the community.

RESEARCH

Robin F. Badgley (with Samuel Wolfe, Meharry Medical College), "The Family Doctor," is a study of the work of a group of doctors started in 1962 and now nearing completion, and provides an analysis of the doctors' work, the fees derived, the time spent, the medical conditions seen, the use of hospitals, findings on check-ups, the extent of preventive services, and house calls and referral patterns. Analyses have been made to learn the relationships between the social characteristics and the pat-

terns of visits by both patients and their families. The extent to which a family doctor looks after families is analysed, as well as which individuals use the service of a particular group of doctors and other services. Substudies relating to family attitudes, a review of the literature, the use of a social worker, and the doctors' prescribing practices have been completed. A book entitled *The Family Doctor*, to be published by Atherton Press, will be issued in 1970.

MERRIJOY J. KELNER, "The Health of Yorkville." This project (funded by the Ontario Department of Health) is designed to study the health problems (physical and emotional) of a group of young people in Toronto designated as "hippies," who are not being reached by and are not availing themselves of existing health services. The focus of the study is on the health status of the "hippie" population, both as clinically appraised and self-perceived. A final report is due in September, 1970. "The Elite Structure of Toronto: Ethnic Composition and Patterns of Recruitment," was the subject of a study involving the extent and methods of non-Anglo-Saxon penetration into positions of power and prestige in Toronto. The aim was to test John Porter's conclusion that elite positions in Canadian society are held almost exclusively by Anglo-Saxons, through analysis of the ethnic composition of Toronto's elite structure. The hypothesis was that the swift pace of development and change had been accompanied by alterations in recruitment patterns to elite positions and by a weakening of the Anglo-Saxon monopoly on elite status. The major finding was that, while the need for trained specialists has been reflected in an increase in the proportions of non-Anglo-Saxons admitted to major functional roles, admission to the core elite (the nucleus or the apex of the elite structure) has not been accorded to non-Anglo-Saxons. The manuscript is currently being reviewed by McClelland and Stewart with a view to publication.

THEODORE D. KEMPER, "Self, Role and Others: A Study in Social Psychology," a research monograph in process, reporting results of a research programme sponsored by the Russell Sage Foundation, N.Y.C. in Social Psychology. Expected completion date: Summer, 1969.

HELEN B. FRITZ, "Health Care Studies." In conjunction with the Department of Medicine at the Toronto Western Hospital, its Family Practice Unit, and the School of Nursing, three interrelated research proposals have been prepared. These studies will focus on: (*a*) "The Hospital and the Community," a study revolving around the factors (social, psychological, cultural and economic) which relate to use of health services in the community; the pathways which individuals follow through the network of health services to the hospital and, finally, the implications for the organization and the structure of medical practice. (*b*) "Health Manpower." The medical role will be analysed, with the focus on health manpower and suggesting an innovative use of nursing personnel to augment medical practice, and the quantitative evaluation of such a programme with the development of a medical care index. (*c*) "The Patient, the Nurse and the Doctor," a study involving an analysis of the patterns of communication between patients and medical personnel, will attempt to delineate some aspects of communication which contribute to optimal health care.

SCHOLARLY ADDRESSES

R. F. BADGLEY, "The Health Needs of the People: Canada's Medical Care Plan," plenary address to 34th Annual Meeting of Canadian Nurses' Association, Saskatoon, July 8, 1968; speaker, Conference on Costs and Organization of Medical Care, Saskatoon, March 21, 1969; rapporteur, Conference on Social Aspects of Health Policy, Toronto, March 27–29, 1969; rapporteur, Conference on Co-operation in Provision of Health Services, Ontario Medical Association, April 14 and 15, 1969; plenary address, "Social Influences on Health Services," Canadian Public Health Association, British Columbia, Vancouver, May 6, 1969; speaker, "Teaching

of Behavioural Science," Conference on Behavioural Science and Medical Education, National Institute of Child Health and Human Development, Boiling Springs, Pennsylvania, May 14–15, 1969; rapporteur and co-ordinator, Workshop on Social Science and Health in Canada, Toronto, June 3–4, 1969.

H. B. FRITZ, speaker, Social Work Department, Toronto General Hospital, March 28, 1969.

M. J. KELNER, speaker, "Ethnic Penetration into Toronto's Elite Structure," The Canadian Sociology and Anthropology Association, York University, June 6, 1969; speaker, Nursing Staff, Emergency Clinic, Sick Children's Hospital, May 26, 1969.

T. D. KEMPER, M. J. KELNER, and H. B. FRITZ, "Behavioural Science and Medical Education," Workshop on Social Science and Health in Canada, Toronto, June 3–4, 1969.

HONOURS

ROBIN F. BADGLEY, Visiting Lecturer, School of Public Health, Columbia University; Member, Committee on Teaching Preventive Medicine in Latin America, Pan American Health Organization, Washington, D.C.; Member, Committee on Community Health Care, Ontario Council of Health; Member, Commission on the Canadian Public Health Association; Member, Research Review Committee, Social Security Administration, Washington, D.C.; Member, Training Committee, National Institute of Child Health and Human Development, Washington, D.C.; Secretary Treasurer, Medical Sociology Section, American Sociological Association; Member, Committee on Human Factors for Conference on Automated Multiphasic Health Screening, National Center for Health Services Research and Development, Washington, D.C.; Member, Committee on Public Health and Mental Health, Ontario Mental Health Foundation; Associate Editor, *Journal of Health and Social Behaviour*; Member, Conferences and Intramural Research Committee, Ontario Mental Health Foundation; Member, Advisory Committee, Saskatoon Community Health Foundation; Member, Public Health Practices Committee, Canadian Public Health Association.

MERRIJOY J. KELNER, Member, Committee for an Experimental Programme for Innis College, University of Toronto.

THEODORE D. KEMPER, Member, Sub-Committee on the Teaching of Medical Sociology, Medical Sociology Section, American Sociological Association.

PUBLICATIONS

BADGLEY, R. F. *Social Science and Health Planning: Culture, Disease and Health Services in Colombia.* New York: Milbank Memorial Fund, 1968. Pp. 352. *Ciencias Sociales y Planeación de la Salud: Cultura, Enfermedad y Servicios de Salud en Colombia* (Spanish Trans.). Pp. 374.

BADGLEY, R. F., and BREGHA, F. J. "Participants Speak Out, and Testimony"; in *Proceedings of the Special Committee on Science Policy, Senate of Canada,* First Session, 28th Parliament, 1968–9, no. 39, pp. 39–7 to 39–12; 4774–5; 4780; 4830–1. Ottawa: Queen's Printer, 1969.

BADGLEY, R. F. (with Elliott, M. R., and Leask, J.) "Report on the Commission on the Canadian Public Health Association" (*Canadian Journal of Public Health*, vol. 60, Feb. 1969, pp. 49–84).

BADGLEY, R. F. (with Kasius, R. V., and Schulte, M.) "Social and Economic Factors and Health Services in Colombia"; in *Study on Health Manpower and Medical Evaluation in Colombia*, pp. 88–94. Washington: Pan American Health Organization (World Health Organization), 1968.

BADGLEY, R. F. (with Wolfe, S.) "The Doctors' Right to Strike"; in *Ethical Issues in Medicine: The Role of the Physician in Today's Society*, ed. E. Fuller Torrey, pp. 301–21. Boston: Little, Brown, 1968.

KEMPER, T. D. "Reference Groups, Socialization and Achievement" (*American Sociological Review*, vol. 33, 1968, pp. 31–45; reprinted in *Social Psychology; Readings and Perspective*, by Edgar F. Borgatta. Chicago: Rand McNally, 1969.
——— "Representative Roles and the Legitimation of Deviance" (*Social Problems*, vol. 13, winter 1966, pp. 288–98; reprinted in *Approaches to Deviance*, by Mark Lefton, James K. Skiller, Jr., and Charles H. McCashy. New York: Appleton-Century Crofts, 1968.

BIOCHEMISTRY

Under the direction of Professor G. E. Connell

During the year 660 students have received instruction in the Department of Biochemistry, the distribution being as follows:

Faculty of Medicine (first professional year)		170
Faculty of Dentistry (first professional year)		123
Faculty of Arts and Science (third year: Honours courses)		69
(fourth year: Honours courses)		35
Graduates enrolled as Special Students in the Faculty of Arts and Science		62
Faculty of Food Sciences (third year)		17
(fourth year)		6
(special students)		1
School of Graduate Studies		177
(*a*) Major Subject Biochemistry	66	
Post-doctoral Fellows	6	
Candidates for Ph.D.	41	
Candidates for M.Sc.	19	
(*b*) From other Departments	77	
(*c*) Special Students	34	
TOTAL		660

Among the graduate students majoring in Biochemistry, 2 held Fellowships of the Medical Research Council, 22 held Studentships of the Medical Research Council, 10 held Province of Ontario Graduate Fellowships, and 5 held Fellowships of the University of Toronto; 36 graduate students were granted Teaching Fellowships by the Department.

The following students registered in the Department of Biochemistry, completed work and presented theses for graduate degrees as follows:

Ph.D. degree

BOEGMAN, R. J.
"ATP-Hydrolysing Enzymes of Membranes Isolated from Muscle"
GUNETILEKE, K. G.
"Biosynthesis of Uridine Diphospho-N-Acetyl Muramic Acid"

M.Sc. degree

GORNALL, D. A.
"Chromatography of Egg-yolk Lipoproteins on Thin Layers of Hydroxyl-apatite"
HOLUB, B. J.
"Structural Characterization of Phosphatidyl Ethanolamine by Hydrolysis with Phospholipase C"
KUROSKY, A.
"Studies on Amino Terminal Groups in Serine Proteinases"
MARAI, L.
"Molecular Species of Lecithins of the Plasma and Erythrocytes of Man and Rat"
OFOSU, F.
"Characterization of the Plasmin Fragments of Human Haptoglobin"
OLIVER, MISS J. E.
"Biosynthesis of UDP-N-Acetyl Muramic Acid in Various Organisms"
WU, T. W.
"Studies on Phospholipase A"

The Department of Biochemistry moved to the 5th floor of the Medical Sciences Building in July, 1968. At the same time Professors R. K. Murray, H. Schachter, and G. R. Williams returned from extended leave, and Professor B. G. Lane joined the

staff. Dr. R. H. Painter was appointed to the staff in both the Department of Teaching Laboratories and the Department of Biochemistry.

Within a few weeks the work of the staff and students was proceeding at a normal pace, for which a great deal of credit must go to those in charge of construction and moving, particularly Mr. Turnbull and Mr. Self. Later in the year staff members who had laboratories in the Spadina Crescent building joined the rest of the Department in the new quarters.

Members of staff have been heavily engaged in planning for the introduction of a new curriculum in Medicine in 1969–70 and in Arts and Science in 1970–71. Two members of staff, Dr. R. K. Murray and Dr. J. Manery Fisher, have served as chairmen of systems committees in the new Medical Curriculum. The department acknowledges gratefully the assistance in teaching which was provided by its honorary staff members: Dr. R. C. Burgess, Dr. A. Kuksis, Dr. J. A. Lowden, Dr. Mario Moscarello, Dr. I. Menon, Dr. A. Sass-Kortsak, Dr. V. K. Murthy, and Dr. B. Sarkar. Dr. Norman Camerman of the Department of Chemistry presented a short graduate course on X-ray crystallography of proteins.

RESEARCH

In Dr. Anwar's laboratory the work on the structure of elastin and the biosynthesis of its cross-links has continued. A degradative technique which involves the reaction with periodate reagent and cleaves the pyridinium ring of desmosine and isodesmosine has been developed (Mr. N. R. Davis). This technique is currently being used to determine the relative positions of different peptides around desmosine and isodesmosine (Mrs. A. Bowman). Mr. N. R. Davis has also studied the mechanism of synthesis of desmosine and isodesmosine with the use of model systems.

Mr. A. Taku and Miss J. Oliver have further purified the two enzymes (transferase and reductase) which catalyze the biosynthesis of UDP-MurNAc.

The studies on the separation and purification of different proteolytic components present in crystalline elastase preparation have revealed the presence of a new carboxypeptidase A.

In Dr. Connell's laboratory, work on problems of immunoglobulin structure has continued with the assistance of Miss D. Parr, Mrs. B. Buchwald, and Mrs. M. Percy. Mrs. E. Adamson has completed the purification of the enzyme γ-glutamyl lactamase from pig liver. Dr. A. Bennick has isolated four protein constituents from parotid saliva and has identified one of them as an esterase.

In Professor J. Manery Fisher's laboratory, studies of the plasma membrane of cells continues. Mr. R. J. Riordan conclusively demonstrated that two membrane-bound ATP-hydrolyzing enzymes could be separated from the same muscle homogenate; one, believed to be the plasma membrane, was Na-, K- dependent and inhibited by ouabain; the other, believed to be the sarcoplasmic reticulum, showed no Na-, K- dependence or inhibition by ouabain. Unlike other AMP-deaminases, the deaminase situated at the surface of muscle fibres has been shown by Mr. J. R. Riordan to be unaffected by the diuretic ethacrynic acid, at concentrations which markedly inhibit Na and K transport. Mrs. E. E. Dryden and Mrs. J. S. Still compared the influence of this drug on cation movement with that of ouabain. Mrs. Ambus, assisted by Mrs. Dryden, has continued to investigate the mechanism by which insulin accelerates the metabolism of lactate in muscle. Oxamate, an inhibitor of lactic acid dehydrogenase, prevented the uptake of L-lactate but not of the D-isomer; insulin partially abolished this inhibition. Dr. J. Forstner has found that Ca^{45}-binding to Hb-free erythrocyte ghosts is favoured under conditions of low ionic strength and high pH. At least three anionic binding sites were suggested by a pH-dependent Ca-binding curve. About 79 per cent of the total Ca bound to the ghosts at 7.4 was associated with the protein component and 14 per cent with the acidic phospholipids.

In Dr. Hofmann's laboratory, the two major projects which are under inves-

tigation are concerned with: (1) the role and conformation of the N-terminal-amino group in serine proteinases and (2) the characterization, X-ray analysis, and amino acid sequence of an acid proteinase from a Penicillium mould.

Miss Dixon has continued and brought to successful conclusion her studies on the conformation state of the N-terminal isoleucine of chymotrypsin and several derivatives of this enzyme. Mrs. L. Rao has made interesting derivatives of porcine pancreatic elastase. She has obtained evidence that the essential terminal amino group of elastase is not necessary for activity under certain conditions of the enzyme. Miss Wasi is using chemical modifications to characterize the acid pH dependent conformational change of pancreatic elastase. Mr. Kurosky has made a quantitative study of the kinetics of reactions of amino terminal groups in model compounds and in proteins with the view of designing conformational probes for this group. Dr. Dzialoszynski is continuing his studies of prothrombin. Mr. Sodek and Mrs. Gray have started studies on the amino acid sequence of the acid proteinase from a penicillium. This enzyme, which has been prepared in relatively large quantities by Mr. Sodek, has been crystallized and is now the subject of a detailed study by X-ray analysis in collaboration with Drs. Nyburg and Cameraman.

In the laboratory of Dr. E. R. M. Kay, work is in progress on aspects of tumor metabolism. Phase contrast fluorescence microscopy has been used to follow the incorporation of macromolecules into the Ehrlich–Lettre ascites carcinoma cells. Mrs. L. Gibb has studied the incorporation of synthetic polynucleotides and their effect on cell metabolism. Mr. D. Bailey has investigated the biological effects of incorporation of nucleic acids by these cells in relation to possible transformation. Mr. R. Hudgin has explored the biological activity of nuclei isolated from these cells by a variety of methods. Mr. A. Milne has investigated the acid soluble components of these cells, and of liver tissue of tumor-bearing mice. Mr. B. Morrish has used electron microscopy to investigate metabolic significance of lipid containing particles in the ascites cells. Mr. H. Pushie has investigated the preparation of RNA obtained from cell nuclei isolated by a number of methods.

In Dr. Lane's laboratory, Miss Tumaitis and Dr. Streeter have been engaged with various chemical and biogenetic investigations of trace components known to be present in the ribosomal and transfer ribonucleates of animal, plant, and microbial cells. Miss Tumaitis is studying 5-carboxymethyluridine, a trace component of yeast and wheat embryo transfer ribonucleates. Dr. Streeter is studying N^2, N^2-dimethylguanosine, a trace component of yeast and wheat embryo transfer ribonucleates.

The work in Professor Murray's laboratory is centred around biochemical aspects of the cytoplasmic membranes of normal and malignant cells. There is much experimental evidence to suggest that alterations of the plasma membrane and endoplasmic reticulum may be crucial changes in the malignant cell. The techniques used in these studies involve mainly ultracentrifugal separations of cytoplasmic membranes monitored by electron microscopy and enzyme analyses. Two principal systems are being investigated—rat liver and cells grown in tissue culture. Mr. Bailey is investigating the interaction of two hepatocarcinogens with the membranes of the endoplasmic reticulum. Of particular interest is the effect of these agents on the biosynthesis and degradation of the endoplasmic reticulum and whether there is a specific interaction of these agents with proteins in the membranes. Miss Cheema is commencing studies on the esterase profile of endoplasmic reticulum membranes and of the turnover of specific proteins.

Mr. S. Chatterjee and Mr. G. Yogeeswaran are studying various aspects of the membranes of tissue culture cells. The former is attempting to isolate the plasma membrane fraction from L cells and mouse fibroblasts. Mr. Yogeeswaran is investigating the phospholipid and glycolipid patterns of these cell types. Similar studies are projected on transformed cells. Miss E. Griffis and Miss S. Hackett are providing technical assistance for these latter studies.

In Dr. Packham's laboratory, platelet aggregation induced by adenosine dis-

phosphate (ADP) has been studied. At the platelet membrane, C^{14}-ADP has been found to be converted mainly to C^{14}-ATP in suspension of washed platelets from rabbits, pigs, or humans. Conditions affecting this conversion have been investigated to determine whether or not it is involved in the mechanism of platelet aggregation. Experiments demonstrating the dependence of aggregation on a source of metabolic energy have also been carried out.

In Dr. Painter's laboratory, studies on the instability of immunoglobulins prepared for clinical use by the cold ethanol process have been completed by the introduction of a modification in the process used in their preparation. The modification, involving only a small change in pH during the separation of fraction III, permits the preparation of immunoglobulin G from human plasma which is not subject to fragmentation during storage in the liquid state and is accompanied by only a small loss in yield.

A study of the biochemistry of the Fc portion of the immunoglobulin molecule has been undertaken in collaboration with Dr. I. Broder. This has involved the separation of the fragments of immunoglobulin G produced by proteolytic digestion and the correlation of the residual biological properties, particularly passive cutaneous anaphylaxis, with the amino acid sequence present in each fragment.

A process for the further purification of erythropoietin from anaemic sheep plasma has been established and the properties of the product with respect to its activity on rat marrow cells in culture determined. In collaboration with Dr. W. R. Bruce, the effect of erythropoietin on the properties of rat bone marrow cells in primary culture has been investigated. It was found that, following exposure to erythropoietin, the sedimentation velocity of the most responsive cells decreased in discrete steps from 6.6 mm/hr to 2.1 mm/hr. The value of 2.1 mm/hr corresponds to the sedimentation velocity of erythrocytes.

In Dr. Schachter's laboratory, Miss I. Jabbal has developed methods for the isolation of Golgi apparatus from rat liver. It has been established by Miss Jabbal and Mr. R. Hudgin that the Golgi apparatus is the site on which at least three glycosyl transferases are located; this finding has an important bearing on the mechanism of plasma glycoprotein biosynthesis by liver. Mr. R. Yuen is working on the path of L-fucose degradation in pork liver. At least 2 enzymes in this pathway have been demonstrated, namely, L-fucose dehydrogenase and L-fuconate dehydrase.

Research in Dr. Scrimgeour's laboratory has been directed to an examination of the chemical and enzymatic properties of folic acid coenzymes and pteridines, and the study of the mechanisms of enzyme reactions involving several nucleotide transformations.

Mr. Mutsufumi Kawai has examined the reduction of folic acid and dihydrofolic acid by sodium dithionite. He has used a polarographic technique to detect a sulphinate adduct as intermediate in the reduction process, and from kinetic evidence has formulated a mechanism for this reduction reaction. Mr. Michael Archer has obtained data to show that quinonoid-dihydropterins, intermediates in the oxidation of tetrahydropterins to 7,8-dihydropterins, are isomerized to the 7,8-isomers by both acid- and base-catalyzed reactions. This unusual chemical feature of these intermediates leads to their extreme instability. Miss Diana Chippel has isolated and characterized the products of the oxidation of dihydrofolate. She has demonstrated that there are two pathways for this oxidation—formation of folate, occurring only at high pH values, and cleavage of the dihydrofolate molecule into a dihydropterin (7,8-dihydroxanthopterin) and para-aminobenzoylglutamate, favoured by a lower pH value. Her results explain for the first time the reactions leading to the oxidative destruction of the coenzyme tetrahydrofolic acid.

Mr. Alan Dennis has been seeking to isolate a dithiol protein which can act as reducing agent for the ribonucleotide reductase enzyme reaction in mammalian tissues. He has detected and is purifying two proteins from sheep liver which seem

to fulfil this function. Mr. Tai-Wing Wu has purified the enzyme IMP dehydrogenase from Bacillus subtilis, and is currently examining the interesting properties of this enzyme. IMP dehydrogenase is inhibited by GMP, presumably by a negative feedback inhibition. The GMP-inhibition can be deleted by chemical treatment of the enzyme, with retention of activity of the enzyme, suggesting that IMP dehydrogenase is allosteric in nature.

Miss Surinder Cheema and Mr. Bruce Berman are studying enzymes related to the hydroxylation of phenylalanine. Miss Cheema has purified the dihydropterin reductase enzyme from sheep liver extracts, and is examining the properties of this TPNH-linked reaction. Mr. Berman has recently commenced a purification of the phenylalanine hydroxylase from *Pseudomonas fluorescens*, with the hope of finding out if there is a metal-ion requirement for this reaction. An understanding of these two enzyme reactions is essential to the study of the disease phenylketonuria.

Dr. Thompson, with the assistance of Mr. Kevin Keough, Mr. Joel Parkes, and Mr. Gordon MacDonald is continuing studies in three areas of lipid metabolism (*a*) metabolism of phosphoinositides in the central nervous system with particular emphasis on the positional distribution and turnover of fatty acids in the phosphoinositides, and the purification and properties of enzymes hydrolysing inositol lipids; (*b*) the composition and synthesis of phospholipids in inner and outer mitochondrial membranes; (*c*) the primary events in liver metabolism associated with fatty infiltration of liver in the choline-deficient animal.

Studies are in progress in Professor D. O. Tinker's laboratory on the chemistry of complex lipids and lipolytic enzymes. In the past year, a detailed investigation of the enzymological properties of Phospholipase A_2 from *Crotalus atrox* venom was completed by Mr. Tai-Wing Wu. Mr. David Purdon is continuing an investigation of the chemical properties of this enzyme. Mr. Kenneth Siren has designed and built a modified temperature-controlled optical system for the Brice–Phoenix photometer, and is completing studies on the phase relationship of lipids in aqueous systems. Mr. Michael Wills is investigating the ionic properties of phosphatidyl inositol. Professor Tinker, with the assistance of Mr. Steven Tom, is preparing large quantities of phospholipids from natural sources. In collaboration with Mr. L. Pinteric, and Dr. Peter Rand (Brock University), the structures of mesomorphic aggregates in lipid-water systems are being studied by electron micrographic and X-ray diffraction techniques.

In Professor Williams's laboratory, Dr. B. H. Robinson, Dr. G. S. Wong, and Miss Jeanne Orr have been investigating the movements of metabolites in to and out of isolated mitochondria in order to evaluate the role of such movements as determinants of energy metabolism. Mr. Hugh Lawford is carrying out studies on similar aspects of metabolite movements in micro organisms. Miss Perry has continued her study of the role of cytochrome b in the electron transfer chain. Dr. Zamudio has been collaborating with Mr. Pinteric on a study of the fine structure of the inner mitochondrial membrane. Miss Skov has continued her study of the products of nitration of cytochrome c. Professor Williams has extended his observations on the different forms of cytochrome oxidase and Miss Hartman is attempting similar approaches on an a-type cytochrome of bacterial origin.

In Dr. Wong's laboratory the phenomenon of inhibitor-induced shift-downs in bacterial cells is being analysed. Mr. R. N. Nazar has found that the inhibition of RNA synthesis during the shift is reversed by methionine additions. Mrs. B. G. Beatty has studied the pulse of protein synthesized during the shift. Development of enzyme kinetic theory has continued in collaboration with Professor C. S. Hanes and Dr. L. Endrenyi, and application has been made in both dehydrogenase and permease systems by Mrs. A. Pincock and Miss P. Gurr.

The research work of the Department has been supported generously by the Medical Research Council, the Cummings Foundation, the National Cancer Institute, Defence Research Board, Banting Institute, Health Sciences Board of the

University of Toronto, J. P. Bickell Foundation, the National Research Council, and the Muscular Dystrophy Association of Canada.

SCHOLARLY ADDRESSES

Connell, G. E., "The structure of antibodies" (Department of Microbiology, Queen's University September 1968); "Currents in modern immunology" (Chemical Institute of Canada, Toronto, November 1968).

Dixon, J. W. and Hofman, T., "Studies on the N-terminal isoleucine in chymotrypsin" (5th meeting of the Federation of European Biological Societies, Prague, July, 1968).

Hofman, T., "Conformational changes in chymotrypsin and elastase" (Hebrew University of Jerusalem November, 1968); "Mechanism of zymogen activation" (Weizmann Institute: Rehovoth, November 1968); "Conformational changes in chymotrypsin and elastase" (Faculty of Agriculture: Rehovoth, November 1968); "Studies on zymogen activation" (University of Birmingham: December 1968); "The activation of zymogens" (Symposium of the American Pancreatic Club, Atlantic City, May 1969).

Manery, J. F., "Active transport and the Na-,K-sensitive MgATPase" (Department of Pathology, McMaster University, February 1969).

Manery, J. F. and Boegman, R. J., "Isolation from muscle of membrane-bound ATP-hydrolysing enzymes" (12th Annual Meeting of the Canadian Federation of Biological Societies, Edmonton, June 1969).

Minta, J. O. and Painter, R. H., "The occurrence, consequences and prevention of fragmentation in immunoglobulin preparations" (12th Annual Meeting Canadian Federation of Biological Societies, Edmonton June 1969).

Packham, M. A., Guccione, M., Kinlough, R. L., and Mustard, J. F., "Conversion of $C^{14}ADP$ to $C^{14}ATP$ by material released from platelets" (12th Annual Meeting of the Canadian Federation of Biological Societies, Edmonton, June 1969).

Painter, R. H., "Observations on the preparation and testing of stable and unstable immune serum globulin preparations" (XI International Congress of Microbiological Standardization, Milan, September 1968).

Rao, L. and Hofmann, T., "Elastase: on the role of the N-terminal valine residue in controlling the activity" (12th Annual Meeting of the Canadian Federation of Biological Societies, Edmonton, June 1969).

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Wong, J. T., Mustard, M. D., and Herbert, E. "Regulation of Amino Acid-specific Transfer RNAs in *Escherichia coli*" (*Biochimica et Biophysica Acta*, vol. 174, no. 2, March 1969, pp. 513–24).

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BIO-MEDICAL ELECTRONICS

Acting Director, E. Llewellyn Thomas

The Institute of Bio-Medical Electronics performs the triple function of providing teaching, research, and communication facilities for the several disciplines involved in bio-medical engineering.

As the field has developed, the Institute's range has had to extend beyond its title. During the year there were eleven students preparing for the doctorate, eleven for the M.A.SC., and two for the M.ENG. They were variously registered in electrical, industrial, and chemical engineering, in physics, pharmacology, physiology, and clinical medicine. Student backgrounds included degrees in engineering and engineering science, in physics, in medicine, and in the basic medical sciences.

We have a full-time academic staff of eight with appointments in electrical and chemical engineering, pharmacology, physiology, and anaesthesia. There are also part-time teachers associated with the Institute from medicine, surgery, pathological chemistry, industrial engineering, and from the Departments of Medical Engineering and Computer Services in the teaching hospitals, as well as various clinical hospital departments.

The core of our graduate student programme remains the research project. However, teaching and research cannot logically be separated and, therefore, we offer eight graduate courses to cover those aspects of medical engineering not available within departmental teaching programmes.

Undergraduate teaching has increased through the introduction of six elective courses for medical students during their third and fourth years. We continue to offer a biomedical engineering option for fourth-year engineering students, and this course, limited by space and facilities, has always been over-subscribed.

We have about thirty research projects in progress. All involve students as members of the research teams, and the great majority are joint studies with various departments in the Faculty of Medicine. They range from basic clinical problems, such as measuring the moment of ovulation, to the development of mathematical

models of the circulatory system. Most graduate students have one supervisor from the Faculty of Applied Science and Engineering, and a second one from the Faculty of Medicine. They are therefore introduced to the techniques and methods of medical research as well as those of engineering science appropriate to their studies. One example of the fruitfulness of this co-operation is the award of first prize by the Canadian Urological Association to a student of the Institute and to a Research Fellow in the Department of Surgery for their studies on electrical methods of stimulating the neurogenic bladder.

It is difficult to measure the effectiveness of teaching and research, but we can feel satisfaction in the calibre of the graduate students attracted, the research funds obtained, and the quality and number of papers published by members of the Institute in refereed journals, although they may only appear in the bibliography of the senior author's department. It is even more difficult to measure the "service" function of the Institute as a source of special knowledge and a place for introducing workers in different fields to one another. But I know of several examples of fruitful research in the university which have resulted from this "marriage broker" role. In addition, last September the Institute was the host organization for the Second Canadian Medical and Biological Engineering Conference, and in June for the Annual Meeting of the Human Factors Association of Canada.

Our renovated laboratories and workshops are very well equipped, and we have received financial support from the university, the federal and provincial governments, industry, and from private granting agencies.

As Acting Director during Professor Moody's sabbatical leave, I must thank my colleagues and the technical and secretarial staff for their hard work and enthusiasm during the year. Our students have shown dedication and initiative not only in their scientific studies, but also through activities such as the student seminars, the presentation of scientific films, and in projects such as the renovation of medical electronic equipment for dispatch to medical clinics in some of the less fortunate parts of the world. I am encouraged to think that a small organization such as ours, devoted to the application of knowledge from the engineering sciences to medicine, may not encounter all the problems facing many larger and older university departments. Perhaps this is because we need not doubt the relevance of our work; we can concentrate on its authenticity.

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Llewellyn Thomas, E. "The Future of Computers in Anaesthesia" (*Canadian Anaesthetists' Society Journal*, vol. 15, no. 6, Nov. 1968, pp. 519–27).

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Llewellyn Thomas, E. *et al. Biomedical Engineering.* Canadian Medical Research, Survey and Outlook, M.R.C. Report No. 2. Ottawa: Queen's Printer, Sept. 1968.

Moody, N. F. (with Paul, W., and Joy, M.) "A Versatile Gamma-Ray Camera for Dynamic or Static Studies in Medicine" (*I.E.E.E. Transactions on Nuclear Science*, vol. NS-16, no. 2, April 1969, pp. 3–18).

Moody, N. F. (with Smith, J. M.) "Application of Fourier Transforms in Assessing the Performance of an Ultrasonic Holography System"; in *Acoustical Holography*, vol. 1, ed. A. F. Metherell H. M. A. El-Sum, and L. Larmore, pp. 97–112. New York: Plenum Press, 1969.

MEDICAL BIOPHYSICS

Under the direction of Professor H. E. Johns

During the year 1968–69 the Division of Cell Biology of the Department of Medical Biophysics has spent a great deal of time and effort in organizing for the move of this group to the Medical Sciences Building. This has involved planning for the recruitment of staff as well as for the acquisition of new equipment. The physical

move to these new quarters will take place in the fall of 1969. The group in Cell Biology has now been established as a separate department of Medical Cell Biology. The new department and Medical Biophysics will continue to cooperate closely.

Professor Aspin with Professors Sass-Kortsak and Levison of the Department of Paediatrics is using radionuclides of copper to study copper metabolism in Wilson's Disease and xenon to study the regional distribution of pulmonary ventilation and blood flow. Much of this work is carried out in the Hospital for Sick Children.

Professor Bruce is examining the effects of chemotherapeutic agents on spontaneous leukemia and transplanted solid tumors in mice with the hope of developing rationales for treatments that might be applicable in the treatment of human neoplasms. He is also examining the process of differentiation in the testes of mice, using in particular the sedimentation velocity separation method developed by Miller and Phillips, and has been involved in the application of computer technology to the handling of medical records at the Ontario Cancer Institute and for the Ontario Cancer Treatment and Research Foundation throughout the province of Ontario.

Professor Carver is concerned with the overall problem of determining the forces which stabilize the 3-dimensional structure of proteins. Using a large spin-echo spectrometer, he is currently examining the way in which ions affect protein stability.

Professor Cinader in collaboration with Dr. S. Dubiski, Dr. H. F. Jeejeebhoy, and Dr. J. E. M. St. Rose is studying a number of immunological problems. In particular, emphasis has been placed on immune mechanisms involved in the problem of tolerance, the action of complement, and the genetic basis of allotypy.

Professor Cunningham is involved in determining the radiation dose distributions within patients undergoing radiotherapy, using experimental and computer methods. A considerable number of computer programmes for both external beam therapy and radium calculations have been developed and are in routine use. Attention is also being paid to developing methods for making corrections for body inhomogeneities.

Professor Gold is studying the replication and modification of nucleic acids and, in particular, the mechanisms of synthesis of bacteriophage, nucleic acids, and the steps whereby the molecules mature and become biologically active.

Professor Howatson is continuing his studies on the fine structure of cells, viruses, and macromolecules, using electron microscopy. His group is isolating numerous virus mutants with a view to relating function to structure.

Professor Hunt and Professor Johns are studying the initial processes of radiation damage produced by ultraviolet light and high energy radiation. The kinetics of formation and decay of triplet excited state in pyrimidines are being studied by flash photolysis techniques. By a unique "stroboscopic pulse radiolysis technique" utilizing the 40-MeV linear accelerator in the Physics Department, Professor Hunt has been studying radiation-induced reactive chemical species which have lifetimes as short as 20 picoseconds.

Professor McCulloch and Professor Till are continuing their studies on the growth and differentiation of stem cells of the blood-forming system. They are using techniques of cell culture and cell separation to investigate cell-to-cell interactions involved in the regulation of the formation of blood cells.

Professor Miller and Professor Phillips are studying the cellular events involved in the differentiation of the immune system. They are continuing to develop physical methods suitable for purifying and analysing the cells at different stages of development.

Professor Ottensmeyer is developing the technique of dark field electron microscopy and is using it to investigate the fine structure of macromolecules such as DNA, transfer RNA, and proteins.

Professor Sheinin is proceeding with studies on the mechanism of oncogenesis by polyoma and SV-40 virus. She is investigating the regulation of cell DNA synthesis

in polyoma-infected cells and the structure of the cell membrane in normal cells and in cells transformed by sv-40 virus.

Professor Stanners is continuing his studies of animal cells at the molecular level. He is concerned with the balance of macromolecular synthesis in cultured cells in different growth states and the effect of viruses on this balance.

Professor Siminovitch and Professor Fuerst are continuing their studies of the bacterial virus lambda. They are investigating the mechanism of action of viral genes through the use of mutants of lambda.

Professor Taylor is investigating the function of the heart and the cardiovascular system from X-ray angiographic pictures, using a combination of television and computer techniques. The techniques wil retrieve numerical information from the pictures and enhance the visual presentation of the picture information. His work is mainly centred at the Toronto General Hospital.

Professor Whitmore and Professor Rauth are examining the effects of ionizing radiation, ultraviolet light, and chemotherapeutic agents on asynchronous and synchronized populations of mammalian cells, with particular reference to their mechanisms of action and the repair of damage produced by these agents.

HONOURS

Professor B. Cinader has been elected chairman of the International Union of Immunologists.

Professors H. E. Johns and Louis Siminovitch were each awarded a Canada Centennial Medal (1967). Professor Siminovitch was elected President of the Canadian Society of Cell Biology.

Professor J. E. Till has been elected to Fellowship in the Royal Society of Canada (Division iv).

SCHOLARLY ADDRESSES

Professor N. Aspin, with Profs. S. M. Hickling, B.P. Mo, and P. R. Swyer, "Regional Ventilation to Blood Flow Ratios in the Lungs of Small Animals," Canadian Physiological Society, Kingston, Ontario, June, 1968; Prof. N. Aspin with H. Levison, L. H. Brooks, T. R. Weng, E. A. Featherby, and H. E. Hall, "Pulmonary Function in Scoliosis," Annual Meeting of the Scoliosis Research Society, Houston, Texas, September, 1968; Prof. N. Aspin with H. Levison, T. R. Weng, E. A. Featherby, and A. C. Bryan, "Measurement of Regional Pulmonary Perfusion and Ventilation in Children using Xenon 133 and a Scintillation Camera," International Congress of Paediatrics, Mexico City, December, 1968.

Professor W. R. Bruce, "The Action of Chemotherapeutic Agents at the Cellular Level," the Medical Center, The University of Alabama in Birmingham, Birmingham, Alabama, January, 1969; "Studies of the Action of Cyclophosphamide," Mead Johnson Research Center, Evansville, March, 1968; "Sedimentation Velocity Separation of Spermatogonial Cells on the Mouse," Stanford University School of Medicine, Stanford Medical Center, Palo Alto, California, March, 1969; "Studies on the Action of Chemotherapeutic Agents on Normal and Tumor Stem Cells," The Canadian Society of Chemotherapy, meeting held at the Park Plaza Hotel, Toronto, Ontario, April, 1969; "On the Mechanism of the Action of Chemotherapeutic Agents," symposium on Current Concepts in Clinical Oncology, New York University Medical Center, New York, May, 1969; W. R. Bruce with H. Lin, "Effects of Cyclophosphamide (CY), 1,3-Bis (2-Chloroethyl-1-Nitrosourea (BCNU), Vinblastine (VLB) and Cytosine Arabinoside (ARA-C) on Lymphoma Cells from the Spontaneous Lymphoma of AKR Mice," Annual Meeting of the American Association for Cancer Research, San Francisco, California, March, 1969; Bruce with H. Lin, "A Critical Evaluation of Cancer Chemotherapy," conference held at Cherry Hill, New Jersey, April, 1969.

Professor J. P. Carver, "A Nuclear Magnetic Relaxation Study of the Interaction of LiBr with Poly-L-Proline," Biophysics Society, Los Angeles, California, February, 1969.

Professor B. Cinader, chairman of session: Symposium III and Lecture "Study of Cell Populations in Terms of Antibody Characteristics," 3rd Symposium/Gamma-Globulin/5th Meeting of the Federation of European Biochemical Societies, Prague, July, 1968; chairman of session: Gordon Research Conference on Immunochemistry and Immunobiology, Kimball Union Academy, Meridan, New Hampshire, August, 1968; joint organizer and participant in panel: Antilymphocyte Serum Workshop, Montreal, August, 1968, April, 1969; lecturer in Panel III. "Immune Recognition and Transplant Tolerance, Dalhousie University's Faculty of Medicine Centennial, Halifax, Nova Scotia, September, 1968; session chairman and discussant: "Tissue Transplantation"; current status in "A Short Course in Human Heredity and Disease," University of Toronto, Faculty of Medicine, Division of Postgraduate Medical Education, Toronto, November, 1968; "Structure of Normal and Abnormal Immunoglobuline"; "The Genetics of Immunoglobulin Production"; "Regulatory Processes of the Immune Response," to 3rd Year Medical Students, Department of Pathological Chemistry, University of Toronto, March, April, 1969; Seminar, "Allotypic Specificity as a Probe in Studies of the Cellular Basis of the Antibody Response," Argonne Laboratories, Argonne, Illinois, April, 1969; chairman and lecturer, "Immunosuppressive Agents and Chemotherapy," Canadian Society of Chemotherapy 5th Annual Meeting, Toronto, April, 1969. Symposium-Chairman "Introduction; Genetics of the Antibody Response" and "Allotypy as a Probe," Symposium on the Genetics of the Antibody Response, XVII Annual Colloquium Protides of the Biological Fluids, Brugge, Belgium, April, May, 1969; "Genetic problems in Immunobiology," Institute for Animal Behaviour, Seewiesen North Munich, Germany, May, 1969; "Allelic Interaction and Exclusion in Cells of the Antibody-forming Apparatus," Karolinska Institute, Stockholm, Sweden, May, 1969; "Presentation to the Senate, Special Committee on Science Policy, Ottawa," May, 1969.

Professor J. R. Cunningham, "Application of Computers in Radiotherapy," University of Pennsylvania, Department of Radiotherapy, January, 1969; member of International Commission on Radiation Units Task Group II D (3). St. Bartholomew's Hospital, London, England, April, 1969; attended meeting I.C.R.U. Task Group II D (2), Institute Gustave-Roussy, Paris, April, 1969; "Empirical Representation of Beam Penumbra." Canadian Association of Physicists, Subject Division Physics in Medicine and Biology, University of Waterloo, Ontario, June, 1969; second International Conference on Uses of Computers in Radiotherapy Organizing Committee and Chairman of Panel, September, 1968.

Professor A. F. Howatson, "The Virion Structure and Function," Chairman of Session I, First International Congress for Virology, Helsinki, Finland, July, 1968; "Studies for Viruses Using Temperature Sensitive Mutants," Queen's University, Department of Biology, January, 1969; A. F. Howatson with A. L. Schincariol, "RNA in VSV-infected cells," 12th Annual Meeting, Canadian Federation of Biological Societies, Edmonton, Alberta, June, 1969.

Professor J. W. Hunt, "Pulse Radiolysis: Studies of Free Radical Reactions with Nucleic Adid Derivatives," to the Department of Chemistry, University of Waterloo, November, 1968; Department of Biophysics, University of Rochester, November, 1968; "Pulse Radiolysis in Picosecond Times," Chemistry and Materials Division, Atomic Energy of Canada Limited, Chalk River, January, 1969; "The Linac, Pulse Radiolysis and Chemistry at the Speed of Light," Department of Physics, University of Toronto, January, 1969; Prof. Hunt with Profs. C. L. Greenstock and M. Ng, "Pulse Radiolysis Studies of Reactions of Primary Species in Water with Nucleic Acid Derivatives," presented at the International Conference of Radiation Chemistry, Argonne National Labs, August, 1968; J. W. Hunt and M. Ng, "Sensitization and Protection During the Radiolysis of Pyrimidines,"

presented at Radiation Research Society, Cincinnati, May, 1969; J. W. Hunt, R. K. Wolff and M. J. Bronskill, "The Solvated Electron at Picosecond Times," presented at the Radiation Research Society meetings, Cincinnati, May, 1969; J. W. Hunt, H. E. Johns, and M. A. Herbert, "Detection of the Triple State in Orotic Acid by Flash Photolysis," presented at the Biophysical Society, March, 1969.

Professor H. E. Johns, "Dosimetry of Photochemistry," International Congress on Photobiology, Hanover, New Hampshire, August, September, 1968; "Biophysics Research at the Ontario Cancer Institute," Guelph University, Guelph, Ontario, October, 1968; "Calculation of Dose from Exposure Measurements," Ontario Cancer Treatment and Research Foundation, Clinical Conference, Kingston, Ontario, October, November, 1968; "Progress in Cancer Research," Annual Meeting of the Newfoundland Cancer Society, Corner Brook, Newfoundland, November, 1968; "Current Trends in Cancer Research," Memorial University Medical School, St. John's, Newfoundland, November, 1968; "Calculation of Dose from Exposure Measurements," Annual Meeting of the American Association of Physicists in Medicine, Chicago, Illinois, December, 1968; "Recent Trends in Cancer Research," Cancer Society Meeting, Westbury Hotel, Toronto, February, 1969; "Research at the Ontario Cancer Institute," Johns Hopkins University, Baltimore, Maryland, April, 1969; "UV Damage and Pyrimidines," Johns Hopkins University, Baltimore, Maryland, April, 1969. J. W. Hunt, M. A. Herbert and H. E. Johns, "Detection of the Triplet State in Orotic Acid by Flash Photolysis," Biophysical Society Meeting, Los Angeles, California, March, 1969; H. E. Johns and G. J. Fisher, "U.V. Photochemistry of Thymine in Solution," Biophysical Society Meeting, Los Angeles, California, March, 1969.

Professor F. P. Ottensmeyer, "Dark Field Electron Microscopy and Its Application to the Elucidation of the Time-Structure of Macromolecules," Department of Biology, McMaster University, Hamilton, February, 1969; Department of Microbiology, Guelph University, Guelph, March, 1969; Department of Biochemistry, Stanford University, School of Medicine, Stanford, California, March, 1969; Department of Biochemistry, University of California, Berkeley, California, March, 1969; Department of Chemistry, California Institute of Technology, Pasadena, California, March, 1969.

Professor R. A. Phillips, "Application of Cell Separation Techniques to Studies on the Differentiation of the Immune System," Department of Biology, Roswell Park Memorial Institute, Buffalo, New York, September, 1968; R. A. Phillips with R. G. Miller, "Analysis of Cells of the Immune System by Velocity Sedimentation," Federation of American Societies for Experimental Biology; Federation Proceedings *28*, (1969) 566, No. 1711; Atlantic City, New Jersey, April, 1969; with G. E. Edwards, "Differentiation of Rosette-forming Cells from Clones of Hemopoietic Stem Cells," Canadian Federation of Biological Societies, University of Alberta, Edmonton, Alberta, June, 1969; with L. Lafleur, "Non-random Expression of Antigen-Sensitive Cells During Regeneration of the Immune System," Canadian Federation of Biological Societies, University of Alberta, Edmonton, Alberta, June, 1969.

A. M. Rauth, "Repair of U.V. Induced Damage in Mammalian Cells," NRCC Associate Committee on Radiation Biology, National Research Council of Canada, Ottawa, Ontario, October, 1968.

Dr. R. Sheinin, "Surface components of normal and virus-transformed mouse cells grown *in vitro*," Microbiology Session of the New York Academy of Science, January, 1969; "Recent Studies on the Surface Structures in Mouse Cells Grown *in vitro*," Mount Sinai Medical School, New York City, Department of Experimental Cell Biology, January, 1969; "Properties of Surface Structures of Normal and Virus Transformed Mouse Cells," Cancer Unit, Biochemistry Department, McGill University, Montreal, January, 1969; "Viruses as Carcinogens," Canadian Society of Microbiology (Central and Western Ontario Branches) April, 1969; "Properties of the Surface Components of Mouse Cells Grown *in vitro*," seminar to Department of Anatomy, McGill University, Montreal, April, 1969; "Viral Oncogenesis and Sur-

face Component of Mouse Cells," seminar to Department of Microbiology, University of Chicago, Chicago, Illinois, May, 1969.

Professor Louis Siminovitch, "Nucleoproteins and Heredity," "Life Cycle of Viruses," Division of Postgraduate Medical Education, Faculty of Medicine, University of Toronto, Toronto, Ontario, October, 1968; "The Dogma of Genetics," Postgraduate Genetics Course, Hospital for Sick Children, Toronto, Ontario, November, 1968; "The Life Cycle of Bacteriophage Lambda and Its Genetic Constitution," "Physiological and Biochemical Characterization of the Lambda Genome," Biochemical Events During Lambda Replication," "Control Processes in Lambda Bacteriophage Biosynthesis," Department of Microbiology, MacDonald College of McGill University, MacDonald College, P.Q., February, 1969; Chaired Session "Science Policy and Society," Canadian Institute of Public Affairs, University of Toronto, Toronto, Ontario, March, 1969; Chaired, Leo Marion Lectures, Division of Biochemistry and Molecular Biology, National Research Council of Canada, Ottawa, Ontario, March, 1969; "Studies on Lambda Development," Montreal Physiological Society, Montreal, P.Q.; Department of Genetics, McGill University, April, 1969.

Professor C. P. Stanners, "Viruses and Neoplasia," Toronto General Hospital, November, 1968; "Studies on Translation in Cultured Hamster Cells," Toronto Biochemical and Biophysical Society, Toronto, Ontario, January, 1969.

Professor K. W. Taylor, "Engineering and Cardiac Transplantation," Engineering Institute of Canada, Niagara Falls, October, 1968; "The Jekyll and Hyde of Medical E Engineering," Engineering Institute of Canada, Annual General Meeting, Toronto, Ontario, March, 1969; "Engineering, the Pacemaker and the Heart," Association of Professional Engineers, Toronto, Ontario, April, 1969; "Electrical and Mechanical Properties of the Heart," Department of Applied Physics, Cornell University, New York, June, 1969.

Professor J. E. Till, "Prospects in the Study of Stem Cell Kinetics," Radiobiology Meeting, National Research Council of Canada, Ottawa, Ontario, October, 1968; "Cellular Differentiation in the Hemopoietic System," Rockefeller University, New York, N.Y., October, 1968; "Hemopoietic Stem Cells," California Institute of Technology, Pasadena, California, January, 1969; Best Institute, University of Toronto, Toronto, Ontario, April, 1969; Department of Embryology, Carnegie Institution of Washington, Baltimore, Maryland, May, 1969; "Course on Cell Proliferation Kinetics," International Union Against Cancer, Max-Planck Institute for Virus Research; Institute for Biology of the University of Tübingen, Tübingen, Germany, March, 1969; "Studies on Stem Cells of the Mouse Hemopoietic System," Third International Conference on the Cell Cycle, Wrightsville Beach, North Carolina, May, 1969; "Cellular Differentiation," The Royal Society of Canada, Ottawa, Ontario, June, 1969.

Professor G. F. Whitmore, "Radiation Biology of Mammalian Cells," Radiotherapy Department, Washington University, St. Louis, Missouri, December, 1969; "Radiation Induced Mitotic Delay," Biology Division, Los Alamos Laboratory, Los Alamos, New Mexico, December, 1968; "Current Trends in Cancer Research," Kiwanis Club, Oshawa, Ontario, April, 1969.

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INSTITUTE OF MEDICAL SCIENCE

Under the direction of Professor J. C. Laidlaw

This is the first report to the Dean on the Institute of Medical Science. The Institute was established in the summer of 1967. Its principal purpose is to provide an interdisciplinary research experience in the area of human biology. The Institute furnishes an opportunity for students to work in a wide range of biological fields on problems which may involve patients and/or experimental animals.

In the spring of 1968 the Institute submitted its M.SC. and PH.D. programmes to the Appraisals Committee of the Ontario Council on Graduate Studies. The external appraisers were Drs. D. V. Bates (Chairman, Department of Physiology, McGill University), T. Kinney (Chairman, Department of Pathology, Duke University), H. G. Kunkel (Professor of Medicine, Rockefeller University), and A. G. Bearn (Chairman, Department of Medicine, Cornell University). The degree programmes were approved by the Appraisals Committee in September 1968.

The staff of the Institute consists of selected members of the clinical and basic science departments of the Faculty of Medicine and of certain departments in the School of Hygiene. The staff numbers fifty-seven of whom thirty-nine are from clinical departments and eighteen from basic science departments.

The Secretary of the Institute is Dr. E. A. McCulloch (Medicine, Medical Biophysics). The Executive Committee consists of Drs. D. Fraser (Paediatrics, Physiology), A. Sass-Kortsak (Paediatrics, Biochemistry), H. Stancer (Psychiatry), I. Broder (Medicine, Pharmacology), G. Steiner (Medicine, Physiology), R. Volpé (Medicine), E. A. Sellers (Pharmacology), the Graduate Secretary, the Director, and three graduate students, Drs. N. Iscove, R. Hudson, and N. Howard. The Student Committee consists of Drs. A. Sass-Kortsak and E. A. Sellers, the Graduate Secretary, and the Director. I wish to express my gratitude to all of these men for their great help during the past year.

During the session 1968–69 there were twenty students in the Institute. Four of these were at the Princess Margaret Hospital, three at the Wellesley Hospital, eight at the Hospital for Sick Children, and five at the Toronto General Hospital. Eight students were registered for the PH.D. degree, ten for the M.SC. degree and two were special students. Each of the students had a programme committee consisting of his supervisor and two other members of staff of the Institute, one of whom was from a basic science department in the Faculty of Medicine. During 1968–69 Student Seminars were capably organized by Dr. G. Steiner. At the spring convocation Dr. C. Morin was granted the M.SC. degree. His supervisor was Dr. A. Sass-Kortsak and the title of his thesis was "Biochemical and genetic studies in cystinuria." The external appraiser of his thesis was Dr. L. Rosenberg, Yale University. At the fall convocation 1969 Drs. J. Levine and J. Dussault will be granted the M.SC. degree. Dr. Levine's supervisor was Dr. J. L. Ruse (Medicine) and the title of his thesis was "Effects of a sulfated mucopolysaccharide on the rat adrenal cortex." The external appraiser of his thesis was Dr. C. J. P. Giroud, Department of Investigative Medicine, McGill University. Dr. Dussault's supervisor was Dr. R. Volpé and the title of his thesis was "Studies of serum triiodothyronine in man." The external appraiser of his thesis was Dr. S. Ingbar, Department of Medicine, Harvard University.

In the session 1968–69 the Institute offered two new courses: "Cellular mechanisms in biology and medicine" (Dr. E. A. McCulloch) and "Clinical respiratory physiology" (Dr. A. C. Bryan, Department of Anaesthesia). For the session 1969–70 the Institute will present two further courses: "Steroid biochemistry" (Dr. J. L. Ruse) and "Human biology" (Dr. J. C. Laidlaw). The latter course will delineate a variety of approaches to the study of normal and abnormal function in man.

During 1968–69 the Institute sponsored two visiting lecturers, Drs. N. Bruchovsky and L. Paunier. Dr. Bruchovsky, from the South Western Medical School, Dallas, spoke on "The mechanism of action of testosterone." Dr. Paunier, from the Department of Medicine, University of Geneva, lectured on "Vitamin D: basic aspects and clinical applications."

As all members of staff of the Institute have appointments in parent departments in the Faculty of Medicine or the School of Hygiene, the summary of their research, publications, honours, and scholarly addresses will be found in the reports of the chairmen of these departments. I wish, however, to make special note of the granting of a Gairdner Award to our Graduate Secretary, Dr. E. A. McCulloch, and his colleague, Dr. J. E. Till (Medical Biophysics).

I believe the Institute has made a good beginning. The standard of its student

applicants has been high and their performance has been most gratifying. To all of those who have helped in this new venture I express my thanks. I am particularly grateful to Dean Ernest Sirluck, Dean A. M. Fallis, Miss J. E. Gordon, and Miss M. F. McNeely of the Graduate School for their great and willing contribution to the establishment and growth of this new Institute.

DEPARTMENT OF MEDICINE

Under the direction of Professor K. J. R. Wightman

This is the fiftieth anniversary of the appointment of Professor Duncan Graham as the first full-time Professor of Medicine in the British Empire. Since this was made possible by the munificence of Sir John and Lady Eaton, the Chair was named after them. Both Lady Eaton and Professor Graham are alive and well, and the Department is ever mindful of the debt we owe them.

The purpose of this gift was to provide the same kind of single-minded devotion to the development of the Department and its scientific basis as had the earlier establishment of full-time professorships in the Departments of Pathology, Physiology, etc. An effort was then made to recruit physicians who combined clinical skills with sufficient scientific training and experience to be able to interpret the advances of science to students and practitioners of medicine.

As science has developed so markedly and as the techniques of biological research have become so complex, it is more and more difficult to combine clinical research with clinical acumen and good clinical teaching. Productive research requires at least 50 per cent of one's time in the laboratory, so it is necessary to have full-time appointments to carry out all these assignments.

There are other reasons, however, for having full-time staff members. Just as the science of today has become more complex, so has the care of patients. The multiplicity of new investigative procedures and new drugs alone contributes to this, but all sorts of other factors are involved also. The modern teaching hospital attracts patients whose problems require considerable time to elucidate. The attempt to close the gap between new science and its application in medicine requires time devoted to developmental research. In addition to all this there is a need to improve the documentation of patients, to review series of cases with similar disease, to study in an orderly fashion the response to various drugs (new and old), as well as to carry on research in education and teaching.

Mindful of these needs, and further impelled by the demands of the new curriculum, which will make heavy increases in the teaching load of the Department, we have recruited more than 100 full-time persons, and the total size of the Department has more than doubled in the past 10 years. Our new recruits include approximately 70 general practitioners at eight hospitals, who receive part-time support for work either in special outpatient clinics or emergency departments. They will form the nucleus for a new Department of Family Practice and Community Medicine which has recently been authorized. It will be some time before all these new members of staff shake down into the various types of balance which will eventually emerge, and for the individuals involved to work out the role for which they are best suited.

In the meantime, we are much heartened by the new research space which has been made available to us in the Medical Sciences Building. So far, 14 modules in that building have been assigned to the Department of Medicine. We have had difficulty in obtaining adequate apparatus to furnish these, but headway is being made with the assistance of the Medical Research Council, the Health Resources Fund, and the Faculty of Medicine. In this process, the support of the Medical Staff Association at the Toronto General Hospital has been most helpful. We are also still using space at 1 Spadina Crescent and 121 St. Joseph St. We require additional space in the various hospitals for research which is closely related to patients, and which would be available

to students based in the hospitals. There is no doubt that the best kind of teaching unit is a hospital that incorporates not only the latest equipment for the care and investigation of patients, but also laboratories for basic and applied research. These are important not only for the new information they can discover, and the impact they may have on the service which the hospital has to offer to patients, but also because they contribute an element of innovation, excitement, and enquiry to which students and staff alike are very sensitive. The teacher we wish to have is one who is imparting first-hand information, which he has examined and tested in the light of his own experience, not one who is prepared to provide the "right" answer to a succession of examination questions.

A great deal of planning has been done at each of the teaching hospitals on this basis. With 19 or 20 subdivisions of internal medicine, many with special branches, there is ample scope for research at all the hospitals without fear of overlap or duplication. The expense is great, but the dividends will be even greater. It is to be hoped that the Independent Planning Committee can be persuaded of this fact.

The Department of Medicine has actively favoured using a number of hospitals for its teaching because of its need for inpatient and outpatient work for its students on an individual basis, as well as for the diversity of experience required.

The role of the teaching hospitals and the way in which they are to work together remains to be hammered out. The teaching function of such a hospital is bound to interfere to some extent with the simple efficiency of its service to patients. Research becomes the responsibility and concern of the hospital in an entirely new way, and until a hospital takes pride in its research, it can hardly be said to have sincerely adopted its academic role. The impact of government support and regulation becomes ever clearer, and the function of Administration and Governors is altered.

Success in any hospital depends on the degree to which mutual understanding and concern about a wide range of problems can be brought about in the medical and non-medical personnel at all levels. Unfortunately the academic professional group is not entirely united in its thinking, so that communication at the present time may produce more confusion than cohesion. This adds to the difficulty of working out a co-ordinated plan for the activities of the large number of hospitals now involved in our programme.

The appearance of a number of new, well-appointed community hospitals in our neighbourhood has not helped. These hospitals have already taken some of our staff, but this year an unprecedented number of resignations has occurred. While we are accustomed to experiencing a drain from other universities, this growing demand from community hospitals is new. The majority of these men are accepting responsible positions in these new hospitals, and are to be congratulated on the compliment which has been paid to them. However, one feels there is still an element of discontent and dissatisfaction in their going. Some of the factors in this have already been mentioned. They include the number of new full-time staff, the emphasis on research, the new arrangements on teaching units, the financial and economic constraints which are being imposed, and the proposals regarding the new curriculum and its demands. All these have contributed to an air of headlong and unpredictable change in the University. In spite of great efforts to increase the mechanisms of communication and participation in the issues, there is widespread distrust and suspicion. Some members of staff are too busy to devote the necessary time to inform themselves. Few people realize how much time is required for this purpose. There is a good deal of discontent with the function of committees. Think-ins and teach-ins are very popular, but the true problems are only defined in the light of frequent and earnest discussion among those who will listen as well as talk, and who will take the trouble to find out the facts before coming to a conclusion. The solution to many problems lies at least partly in each person undertaking to do his own job better. Time spent criticizing the way another man is working is worse than wasted. Nonetheless, we all need as much help as we can get from our fellows. The degree to

which we can be truly helpful to one another, at the same time taking pleasure in each other's triumphs, will determine the level of success to be attained by each of the hospitals and the Medical School as a whole.

In many ways this marks the end of an era. A new Department Head is to be appointed, a new curriculum is being introduced, and many changes in the pattern of University and departmental administration appear imminent. In some ways the function and importance of the Department is being eroded. However, we have an excellent staff, improving facilities, a great tradition, and withal a high degree of acceptance of change and innovation. I foresee a great success in spite of the monumental task we have undertaken. Speaking personally, I thank all those who have helped me so greatly. I hope to enjoy similar co-operation in my new post, and look forward to some degree of participation in the future affairs of the Department of Medicine as well.

PERSONNEL

Dr. Walter Campbell has been appointed Professor Emeritus. He has continued his work on newer methods of estimating calcium, magnesium, sulphate, phosphate, etc. until the present time. He joined the Department in 1919.

Dr. Ian Macdonald has reached retiring age as far as the Division of Postgraduate Medical Education is concerned, but will continue as a Professor in the Department of Medicine. His work has been greatly appreciated.

Dr. E. F. Brooks has been succeeded as Physician-in-Chief at St. Michael's Hospital by Dr. J. T. Marotta. Dr. Brooks joined the Department in 1931 and has received many tributes in appreciation of the contribution he has made. He too will continue in the Department as a Professor, in charge of the Departmental Committee on Examinations.

New appointments in the year 1968 number 60. We welcome them all and wish them well, but will not list all their names here.

Resignations include the following. Dr. J. B. Armstrong is moving with the Canadian Heart Foundation to Ottawa. Dr. H. J. M. Barnett has accepted an important appointment in the newly formed Division of Neurologic Sciences at the University of Western Ontario. Dr. John Digby is to be Physician-in-Chief at the Humber Memorial Hospital. Dr. W. E. Hall is to be Physician-in-Chief at the Scarborough Centenary Hospital, taking with him Drs. D. B. Moran, M. J. Porter, and M. Pflug.

Drs. B. M. Sanders and D. M. Finlayson will be joining the North York General Hospital. Dr. Roman Einhorn has decided to return to Hamilton. Dr. G. Mainprize is resigning from the General Medical Outpatient Clinic at the Toronto General Hospital. All these men have made a notable contribution during their time at the University. We wish them all possible success and happiness in their new work.

DEPARTMENTAL ACTIVITIES

The undergraduate teaching has been supervised by a variety of persons. Dr. L. Loach is in charge of the Second Year programme, except for that part of it which is undertaken entirely at the Toronto Western Hospital. For the first time, Dr. Allan Knight has supervised the Third Year teaching programme and has visited the various hospitals and third year teachers in order to integrate and co-ordinate the programme better. The final year teaching has been the responsibility of the Head at each hospital.

In the postgraduate field Dr. J. Hilliard has been developing an increasing degree of organization and supervision over the programme. The number of trainees is now more than 180. The quality of candidates seems to be very good and their performance at the Royal College examinations has been extremely satisfactory. Various improvements in methods of evaluation of trainees during their period with us

are being instituted. The examination procedures in the three clinical years are supervised by a Committee headed by Dr. E. F. Brooks. New methods of examination are being introduced and tested.

The co-ordinators who were appointed two or three years ago to supervise activities in such fields as haematology, rheumatology, neurology, cardiology, etc. have had various degrees of success. They were asked to undertake responsibility for concerted planning and action in the fields they represent. The amount of authority given them has been commensurate with the progress they have made. They have encountered various degrees of resistance to regimentation on the part of the staff of the teaching hospitals, although in some instances a satisfactory *modus operandi* has been worked out, particularly in relation to the postgraduate training programme.

VISITORS

Dr. C. S. Brown, Baltimore, Maryland; Dr. D. H. Cameron, Dryden, Ontario; Dr. W. B. Castle, Boston, Massachusetts; Dr. P. A. Chervenick, New Brunswick, New Jersey; Dr. K. Clarke, St. Thomas, Ontario; Dr. J. Cooper, Buffalo, New York; Dr. J. V. Dacie, London, England; Dr. V. DeVita, Bethesda, Maryland; Dr. F. Dixon, LaJolla, California; Dr. P. Fessas, Athens, Greece; Dr. E. R. Giblett, Seattle, Washington; Dr. G. Goldenberg, Winnipeg, Manitoba; Dr. J. L. Gowans, Oxford, England; Dr. R. Gramiak, Rochester, New York; Dr. M. Gueron, Beer-Sheva, Israel; Dr. D. Henderson, Boston, Massachusetts; Dr. R. Hertz, Bethesda, Maryland; Drs. Kurt and Rochelle Hirschhorn, New York, New York; Dr. G. Hitchings, Tuckahoe, New York; Dr. J. Holland, Buffalo, New York; Dr. Z. Laron, Tel Aviv, Israel; Dr. T. Lockwood, Cooksville, Ontario; Dr. A. J. Longmore, Kitchener, Ontario; Dr. G. Mathe, Paris, France; Dr. D. Milne, Kincardine, Ontario; Dr. P. L. Mollison, London, England; Dr. R. Naylor, Edmonton, Alberta; Dr. J. Paige, Brockville, Ontario; Dr. I. Plenderleith, Vancouver, British Columbia; Dr. B. Sanders, Welland, Ontario; Dr. P. Shah, Rochester, New York; Dr. P. Sonksen, Boston, Massachusetts; Dr. H. Swan, Barrie, Ontario; Dr. K. Thurau, Munich, Germany; Dr. D. A. Wadell, Calgary, Alberta; Dr. M. Waxman, Durham, North Carolina; Dr. A. Westerlund, Stockholm, Sweden; Dr. I. Woolfrey, Botwood, Newfoundland; Dr. D. Wright, London, England.

RESEARCH

Allergy and Immunology

Dr. A. Knight (SBH) is beginning a programme to examine the serum of chronic chest patients or patients with asthma for precipitating antibody systems to aspergillus fumigatus. Dr. W. Pruzanski (WH) is studying the structure of immunoglobulins; lysozymes; collagen diseases with monoclonal spikes; light chain disease and IgD myeloma protein. Dr. R. Bladek (TWH) is continuing a long-term study of allergy to insects with particular reference to the natural history and the effects of therapy. Dr. I. Broder (TWH) is studying the mechanism of immunologic histamine release in the guinea pig lung, the role of soluble antigen-antibody complexes in human and animal diseases (in collaboration with Drs. J. Reynolds, D. Gordon, and M. Urowitz of Toronto and Dr. L. Karstad of Guelph), and the correlation between clinical and immunological parameters of persons with atopic respiratory disease (in collaboration with Dr. D. R. McCourtie). Dr. S. Dubiski (TWH) has been conducting research on the problems related to the antibody synthesis and structure. Dr. D. Osoba (PMH) has continued research into the differentiation and cell–cell interactions in the immunological system.

Cardiovascular

Dr. H. E. Aldridge (TGH) is carrying out the following clinical studies: the value of aortic valve homografts, a reassessment of left ventricular function in patients who have had internal mammary artery implantation, and the assessment of closure of

atrial septal defects in patients over the age of 35. Dr. D. L. Watt (TGH) is continuing a study of the whole blood clotting time in polystyrene tubes. He is following a large group of diabetic patients to see whether thromboembolic complications are more frequent in those with short clotting times. Dr. W. T. W. Clarke (TGH) has been studying endocarditis, particularly following open-heart surgery. Dr. J. E. Morch (TGH) is carrying out studies on quantitation of aortic insufficiency using constant rate infusions of 133-Xenon solution, myocardial blood flow using 133-Xenon washout technique, objective analysis of coronary arteriograms with the assistance of the Medical Engineering and Photographic Department and renal blood flow by the 133-Xenon washout technique. A post-operative study of patients with adult tetralogy who have had total correction is also being conducted. In collaboration with Dr. W. Mahon, he is also studying the haemodynamic aspects of Aptine, a new beta blocking drug. Drs. K. W. G. Brown and R. L. MacMillan (TGH) have been investigating the factors affecting mortality in patients with acute myocardial infarction. A new antiarrhythmic agent, bretylium tosylate, is being studied. In collaboration with Dr. W. Mahon, the haemodynamic effects of glucagon are being determined. A study of cardiac arrhythmias and the pre-hospitalization phase of acute myocardial infarction is also underway. Dr. R. L. MacMillan, in conjunction with Dr. F. Monkhouse and Mr. Campbell Cowan of the Department of Physiology, has been studying the flow of red cells in a model system designed to simulate flow in the microcirculation. Dr. W. F. Greenwood (TGH) has been studying the co-existence of aortic valve disease and coronary artery disease. Dr. W. A. Mahon (TGH) is continuing studies on the cardiovascular effects of glucagon in shock, and the distribution of doxycycline in man. Comparative studies of Bretylium and Lidocaine in cardiac arrhythmias and the cardiovascular effects of beta adrenergic blocking agents other than Propranolol are also being carried out. Dr. E. D. Wigle (TGH) has continued his studies of mitral regurgitation in muscular subaortic stenosis. Other studies include an assessment of long-term Propranolol therapy in patients with muscular subaortic stenosis, ventricular volume studies using computerized scanning techniques, and redefinition of the normal anatomy of the mitral valve (in collaboration with Dr. Silver of the Department of Pathology). Dr. E. J. Noble (TGH), with Drs. Mahon and Watt, is assessing Aptine in patients with angina pectoris. A clinical followup of patients with ventricular septal defects is being conducted with Drs. Keith and Morch. He is also reviewing, with Dr. W. F. Greenwood, patients having mitral commissurotomy during pregnancy. Dr. B. Berris (NMSH) has initiated a study of the effect of Propranolol on the cold pressor response in normal patients and in patients with hypertension. Dr. L. Casella (SMH) is setting up a project using vectorcardiography to study patients with right bundle branch block and left axis deviation. Dr. J. K. Wilson (SMH) is continuing to evaluate patients undergoing heart surgery. In addition, studies are being carried out of the use of various drugs and cardioversion in the management of cardiac arrhythmias. Dr. P. G. Forbath (SMH) (in cooperation with Drs. Casella, Douglas, Yao and Wilson) has carried out extensive investigations of the denerved heart as seen after cardiac transplantation. Dr. D. S. Beanlands (TWH) and Dr. S. Lenkei (TWH) have been carrying out research in the field of heart transplantation. Dr. T. Zsoter (TWH) has been investigating the effects of various drugs on the cardiovascular system, particularly the veins.

Dermatology

Dr. H. J. Donsky (TGH) has assessed the use of high dosage micronized griseofulvin in the therapy of psoriasis and the use of complamin in the therapy of vitiligo. Dr. D. P. Varadi (WH) has carried out a study of oversulfation of acid mucopolysaccharides. A study of age-related chemical changes in a scleroprotein of human skin has also been carried out.

Endocrinology

Dr. B. Webster (TGH) using assays of human growth hormone and human thyroid stimulating hormone has been studying patients with pituitary, hypothalamic, and

thyroid disease. Dr. C. Ezrin (TGH) has continued to study the kinetics of thyroid hormone transport and the nature of the binding of thyroid hormones in the circulation and tissues (in collaboration with Dr. R. Volpe and Dr. A. Zaninovich). Dr. J. C. Laidlaw (TGH), in collaboration with Dr. J. Ruse and Dr. I. Salti, is conducting studies of patients with hypertension and increased aldosterone secretion. Dr. H. P. M. Higgins (SMH) has been using phantoms to determine the size of lesions potentially demonstrable by scintiphotograph with Pho/Gamma II Camera and Technetium^{99m}. A total of 1,621 patients have been studied with the Pho/Gamma Camera using Technetium^{99m}. In collaboration with Dr. R. Warren, he has studied patients with hyperthyroidism with regard to malabsorption. He has also studied thyrotrophin levels of a patient with hyperthyroidism associated with hydatidiform mole (in collaboration with Dr. R. Borth). He has continued a study of subacute thyroiditis in an attempt to isolate a virus agent (in collaboration with Dr. A. Katz of the Department of Pathology and Dr. A. Zbitnew). Dr. R. Volpe (WH) is conducting studies of triiodothyronine metabolism and thyroid function in isolated bovine thyroid cell suspensions. Dr. D. W. Killinger (WH) is carrying out research activities in three areas—a study of patients with testicular femininization, a study of the metabolic clearance of dehydroisoandrosterone sulfate from the blood, and a study of the metabolism of 11-beta-hydroxyandrostenedione. Dr. D. L. Schatz (TWH) continues an assessment of the influence of heparin on thyroid function. In addition, an evaluation of a serum thyroxine-triiodothyronine combination in one pill as replacement thyroid hormone therapy and a study of the influence of endogenous elevations of the serum free thyroxine on TSH levels is being carried out in combination with Dr. R. D. Utiger of St. Louis.

Gastroenterology

Dr. S. V. Feinman (NMSH) is doing a clinical evaluation of LDH-isoenzymes. A method of fractionation of bile and separation into fractions containing proteins and amino acids was established. Experimental production of gallstones was achieved. Methods of qualitative measurement of bile acids in bile were established and a method of enzymatic quantitative measurement of bile acids in bile and plasma is being developed also. Dr. K. N. Jeejeebhoy (TGH) has been carrying out basic research into the mechanism of the synthesis of liver-made proteins. Dr. M. M. Fisher (TGH) has completed a technique for the perfusion of the isolated rat liver and has studied the influence of an artificial kidney on the perfused liver preparation. Studies are also underway on some aspects of bile acid metabolism (in collaboration with Dr. A. Kuksis of the Banting and Best Research Institute and Dr. K. Miyai of the Department of Pathology). Dr. J. R. Bingham (TWH) has developed a new method for measuring gastric acidity using a Radio Telemetering Capsule. He is also assessing the effect of the standard ulcer regimens in controlling gastric acidity. Dr. N. Diamant (TWH) has commenced a study of the electrical and mechanical properties of esophageal muscle and its mechanisms of control. Electron microscopic and histochemical studies are being carried out on esophageal striated muscle. Dr. C. Hetenyi (WCH) has been studying 50 patients with "Hippie Hepatitis" arising from an outbreak that started in July, 1968. She is also continuing her study of the exocrine function of the pancreas.

Haematology and Cancer Research

Dr. J. G. Watt (TWH) has investigated the use of cryoprecipitate in the control of bleeding in haemophilia and Von Willebrand's disease. He is also beginning a controlled study of Daunomycin in the treatment of leukemia. Dr. J. H. Crookston (TGH) has carried out research on hereditary dyserythropoietic anemia (in collaboration with Dr. W. Francombe), transplantation immunology of the heart (with Dr. K. Shumak and Dr. B. S. Goldman), the Ii blood group system, and abnormal haemoglobins. Dr. J. G. Scott (TGH) has been doing clinical reviews of patients with smouldering leukemia, thrombocythemia, and Waldenstrom's macroglobulinemia. Dr. R.

Herst (TGH) has been carrying out the following clinical investigations: (i) prophylactic treatment of haemophilia patients, using cryoprecipitates, (ii) clinical trials of factor IX concentrate preparations in the treatment of patients with haemophilia B, (iii) assessing various techniques for detecting intravascular clotting, and (iv) coagulation testing in dogs who have had cardiac transplants. Dr. E. A. McCulloch (PMH), in collaboration with Dr. J. E. Till, continues investigations of the control mechanisms affecting hemopoiesis. Dr. R. E. Alison (PMH) has studied the value of local or regional radiation in early Hodgkin's Disease. Clinical trials of chemotherapeutic agents are also being carried out. Dr. A. J. Becker (PMH) has been investigating the molecular basis of genetic recombination. Dr. R. Hasselback (PMH), in collaboration with Dr. E. A. McCulloch, has been studying the growth of human bone marrow stem cells in patients with Hodgkin's disease and other lymphomas. Dr. D. E. Bergsagel (PMH) has been involved in a number of research activities. These include: determination of the generation time of tumor cells grown *in vivo*, using tritiated thymidine; investigation of a spleen colony method for assaying tumor stem cells; attempts to separate different classes of tumor cells by velocity gradient sedimentation; and the development of an *in vitro* culture technique for assaying tumor stem cells. Clinical chemotherapy trials are continuing on patients with lung cancer, Hodgkin's disease, and patients with metastatic melanoma. Dr. D. H. Cowan (PMH) has been studying *in vitro* lymphocyte cultures and has started a preliminary study of pulse-height analysis of red cell size and frequency distribution. Dr. J. W. Meakin (PMH) continues to investigate an androgen-dependent mammary tumor in the mouse to determine the cellular basis of androgen dependence and secondly to investigate the reasons for the enhanced killing of tumor cells by cyclophosphamide when stimulated by androgens. Clinical research is also being carried out on ovarian irradiation and prednisone following mastectomy for carcinoma of the breast, effects of chemotherapeutic agents on hormone-dependent neoplasms, and immunization of patients with diazotized extracts of their own tumors. Dr. J. D. Hart (TEGH) has carried out an assessment of various laboratory tests to detect evidence of R^H sensitization. Trials of chemotherapy drugs for treatment of various malignancies are being continued. A study of the significance of a sed rate of over 100 mm/hour was carried out. Immunoelectrophoretic studies are being done on patients with metastatic carcinoma. Dr. J. S. Senn (SBH), in co-operation with Dr. E. A. McCulloch and Dr. J. E. Till, has been studying tissue cultures of human bone marrow cells.

Metabolism and Diabetes

Dr. B. Birchwood (WCH) has begun studies on lipids. Drs. J. Davey, A. Kenshole, and B. Birchwood (WCH) have begun a study of aging in women. Dr. A. Angel (TGH) continues projects concerned with the mechanisms of lipid synthesis, storage and transport in isolated white adipose cell and brown adipose cell systems. Studies are also under way concerning the structure and composition of hormone-sensitive membrane components of adipose cells. Dr. G. Steiner (TGH) is studying the regulation of adipose tissue metabolism and the transport of lipoproteins in the plasma. Dr. J. E. Harrison (TGH), in association with Dr. K. G. McNeill of the Department of Physics, is using nuclear physics techniques in clinical research problems. The main interest is in the calcium metabolism of persons with metabolic bone disease. Dr. C. K. Gorman (TGH) is continuing his research work on the radio-immunoassay of glucagon and the influence of insulin on free fatty acid utilization by the liver. Dr. M. L. Halperin (SMH) has been mainly involved in the study of metabolic control mechanisms and specifically in the control of glucose metabolism in adipose tissue and the control of triglycerides and fatty acid synthesis. Dr. A. Little (SMH), with Dr. M. Antar, has shown for the first time that, in humans, dietary sucrose is hyperlipidemic only in combination with animal fats containing saturated fatty acids and cholesterol. A comparison of the effects of coffee and decaffeinated coffee on serum lipids in humans is being carried out. With Dr. H. Shanoff, it was found that slight cardiac enlargement adversely affected prognosis in survivors of myocardial infarc-

tion and that fluoroscopy was the best method for determining heart size. Dr. P. G. Walfish (NMSH) is conducting animal studies on the mechanism of action of three drugs (diazoxide, theophylline, and cyclic AMP) that produce hyperglycemia and the role of adrenergic receptors. Studies regarding the role of adrenergic receptors in insulin and growth hormone secretion are in progress. The evaluation of the effects of perchlorate and iodine on Technetium^{99m} in thyroid scintiscans is also being investigated. Dr. C. S. Saiphoo and Dr. R. C. Charron (SBH) are studying the changes in calcium, phosphorous, and bone metabolism using tap water as compared with deionized water as the dialysate in chronic haemodialysis.

Neurology

Dr. R. Lee (TWH) has been carrying out clinical investigations on epileptic disorders. A study of nerve conduction in uremic patients has been initiated. Dr. B. M. Stewart (SMH) continues investigations into the responsiveness of normal and pathological human cerebral vessels. Dr. J. C. Richardson (TGH) has been carrying out a clinical review of head injuries from industrial accidents. Dr. M. Hill (TGH) in association with Dr. J. C. Richardson has been carrying out a clinical trial using L-dopa in patients with Parkinson's Disease. Dr. J. R. Wherrett (TGH) has continued chemical studies of glycolipids in health and disease and structural studies of gangliosides from human erythrocytes. A form of adult neurovisceral lipidosis is under study and an increase in an unusual phospholipid, tentatively identified as lysobisphosphatidic acid has been found. Changes of glycolipids of nerve undergoing Wallerian degeneration are being investigated with Dr. A. J. Yates. Dr. D. R. Crapper (TGH), with the assistance of Dr. W. Brown, is studying the pathophysiology of neurofibrillary tangles by means of intracellular microelectrode recordings from cortical and spinal neurons. Dr. O. F. Veidlinger (WCH) has carried out research on the blood brain barrier. He has also collaborated with Dr. Crapper in inducing neurofibrillary tangles in the neurons of experimental animals by systemic injection of base metals. Dr. O. Kofman (NMSH) has been actively engaged in the clinical research evaluation of the substance L-dopa with reference to its use in Parkinson's disease and extrapyramidal disorders. Dr. R. M. Armstrong (TGH), using the electron microscope, has made examination of muscles in regard to the structure of myosin filaments, using immunoflourescent techniques.

Renal Disease

Dr. G. W. Smith (WH) has been investigating secondary and tertiary hyperparathyroidism in patients undergoing chronic dialysis. Dr. D. R. Wilson (TGH) carried out studies of experimental renal disease in rats using micropuncture techniques. Studies of calcium metabolism and urine acidification were carried out on patients with renal calculi, renal tubular defects, and renal allografts. Dr. G. deVeber (TWH) correlated clinical, radiographic, biochemical, and histological parameters in renal osteodystrophy (in collaboration with Drs. Rapoport, Lloyd, and Rabinovich). A long-term study of the effects of immunosuppressive drug therapy in glomerulonephritis is continuing (in collaboration with Dr. Rapoport). Haematological disorders related to immunosuppressive drug therapy are being studied in collaboration with Dr. D. Ley. Dr. A. Rapoport (TWH) has assembled data on 35 patients with idiopathic focal proliferative glomerulonephritis (in collaboration with Dr. C. McLean and Dr. G. deVeber). He has also reviewed the results of steroid therapy in adults with nephrotic syndrome (in collaboration with Dr. G. deVeber). In addition, a study of standardized dehydration tests of renal concentrating capacity was carried out. Dr. M. Robertson and Dr. M. Johnson (WCH) have set up a study of urinary tract infections with serotyping of E. Coli and measurement of antibody levels.

Respiratory

Dr. S. Epstein (TWH) carried out a clinical trial of Carbenicillin in the treatment of

respiratory tract infections. Dr. C. Woolf (TGH) is conducting a study of the respiratory effects of regular cigarette smoking in women, an evaluation of the surgical treatment of emphysema, and a study on the effects of variation of instantaneous rate of change of transpulmonary pressure.

Rehabilitation

Dr. W. M. Franks (TWH) is continuing studies of the effects of oral zinc on healing of ulcers in the geriatric patient. Dr. J. S. Crawford (TWH), in collaboration with Dr. A. Wiley, Dr. J. Gardiner, and Dr. H. Hamilton, has been determining the incidence of thrombo-embolic disease in fractured hips through venography. The value of anticoagulants is being studied in these patients. A study is also being done to determine a satisfactory method of assessment of the rheumatoid hand, pre- and post-operatively.

Rheumatology

Dr. W. J. Reynolds (TWH) is conducting a prospective study of the natural history of synovitis of the hand and turnover studies of rheumatoid factor. Dr. M. A. Ogryzlo (WH) is doing research on quantitation of the immunoglobulins in the rheumatic diseases (in collaboration with Dr. Gordon and Dr. Pruzanski). A study of the structure of immunoglobulins and their correlation with response to therapeutic measures in myeloma and related diseases is also being carried out in collaboration with Dr. Pruzanski and Dr. Bergsagel. In collaboration with Dr. J. Houpt, he is doing a study on tryptophan metabolism in rheumatoid arthritis and the collagen disease. He is also doing research on uric acid metabolism and oxypurine metabolism under the influence of allopurinol therapy in gout, immunoglobulins and lysozyme (muramidase) in synovial fluid (in collaboration with Dr. Pruzanski). Dr. D. A. Gordon (WH) carried out studies of rheumatoid arthritis and related rheumatic diseases. Microbiological tissue culture and serological studies of patients with rheumatoid arthritis and other related rheumatic diseases were carried out in collaboration with Dr. A. E. Franklin. Dr. H. A. Smythe (WH), in collaboration with Dr. J. Blakely, is carrying out research on the effect of sulfinpyrazone on morbidity and mortality from vascular disease. An assay of xanthine oxidase in liver and bone marrow was done. Studies were done on the anatomy of the rheumatoid hand, assessment of deformity in the rheumatoid patient, and a population survey for prevalence of ankylosing spondylitis among Indians of Bella Coola, B.C. In collaboration with Dr. A. H. Little and Dr. P. S. Rosen, a 20-year review of 100 patients with ankylosing spondylitis was carried out. Dr. J. B. Houpt (NMSH) was involved in the following research: synovial analysis-elucidation of (*a*) the role of the RA cell and (*b*) crystals in synovitis, investigation of tryptophan metabolism in patients with Parkinson's disease treated with L-dopa, tryptophan metabolism in scleroderma and rheumatoid arthritis, purine metabolism-elucidation of techniques for determination of plasma oxypurine, and a study of effect of allopurinol on renal lithiasis. Dr. D. D. McCarthy (TGH) has recently set up a laboratory to study synovial fluid. In collaboration with Dr. W. Mahon, the drug Glifinan is undergoing a clinical trial.

Nuclear Medicine

Dr. D. E. Wood (TGH). A whole body counting facility was opened at the Toronto General Hospital. Research projects are being delineated so that this facility may be utilized to the greatest advantage. The department has collaborated with Dr. C. Woolf in the surgery of emphysema project. With the co-operation of the Division of Neurological Sciences and Dr. S. Murray, the department has performed myeloscintigraphy so that normotensive hydrocephalus could be assessed.

HONOURS

Dr. R. Alison, Chairman, National Education Committee, Canadian Cancer Society.

Dr. D. Beanlands, Fellow, American College of Physicians; Associate Fellow, American College of Cardiology.

Dr. R. Bladek, Member, Ontario Thoracic Society; Fellow, American College of Chest Physicians; Member, American Thoracic Society.

Dr. W. R. Campbell, Appointed, Professor Emeritus, Department of Medicine.

Dr. W. T. W. Clarke, Fellow, American College of Physicians.

Dr. J. H. Crookston, Visiting Lecturer, University of Mississippi Medical School; Counsellor, International Society of Blood Transfusion; Membership Committee, Committee on Interdisciplinary Relationships and Education and Training Committee of the American Society of Hematology.

Dr. N. Diamant, Member, Canadian Association of Gastroenterology.

Dr. S. Dubiski, Secretary, Canadian Society for Immunology; Council Member, Ontario Antibody Club; Member, American Association of Immunologists; Member, New York Academy of Sciences.

Dr. M. M. Fisher, Member, Canadian Society for Clinical Investigation; Member, American Association for the Advancement of Science.

Dr. W. M. Franks, Chairman, Section of Physical and Rehabilitation Medicine, Ontario Medical Association.

Dr. D. A. Gordon, President, Clinical Research Society of Toronto; Member, National Scientific Committee and Director, Ontario Division, Canadian Arthritis and Rheumatism Society; Fellow, American College of Physicians.

Dr. C. C. Gray, Executive Medical Director, Ontario Thoracic Society.

Dr. M. Halperin, Member, American Federation for Clinical Research; Member, Canadian Society for Clinical Investigation.

Dr. G. D. Hart, Chairman, Museum Committee, Academy of Medicine; Executive Committee, Ontario Medical Association, Section of Hematology.

Dr. R. Hasselback, Board of Governors, Toronto Institute of Medical Technology.

Dr. R. Herst, Member, Canadian Hemophilia Society Medical and Scientific Advisory Committees, National and Ontario Chapters.

Dr. J. Hogarth, Director, Ontario Cancer Society and Education Committee.

Dr. J. B. Houpt, Medical Advisory Board, Canadian Arthritis and Rheumatism Society, Ontario Division.

Dr. D. W. Killinger, Member of Council, Clinical Research Society, Toronto; Member, American Federation for Clinical Research; Member, Canadian Society for Clinical Research.

Dr. O. Kofman, Neurological Representative, Editorial Board, Applied Therapeutics.

Dr. P. A. H. King, Elected Fellow of the American College of Cardiology, April 1969.

Dr. A. Knight, Vice President, Canadian Academy of Allergy and Clinical Immunology.

Dr. R. Lee, Active member, American Association of Electromyography and Electrodiagnosis; Member, Board of Directors, Ontario Epilepsy Association.

Dr. M. Lenczner, Fellow, International Society of Tropical Dermatology.

Dr. S. Lenkei, Fellow, American Heart Association, Council on Clinical Cardiology; Fellow, American College of Physicians.

Dr. J. A. Little, Chairman, Ontario Heart Foundation Scientific Advisory Committee on Atherosclerosis; Ontario Heart Foundation, Medical Committee; Member, Toronto Diabetes Society; Member, Clinical Research Society of Toronto; Member, American Heart Association, Council on Atherosclerosis; Member, Canadian Society for the Advancement of Health Sciences; Member, Canadian Society for Clinical Investigation.

Dr. D. D. McCarthy, Corresponding Member, Ontario Division, Canadian Arthritis and Rheumatism Society.

Dr. E. A. McCulloch, editor, Journal of Cellular Physiology.

Dr. J. T. Marotta, Professor and Physician in Chief, St. Michael's Hospital.

Dr. J. W. Meakin, Representative of the National Cancer Institute of Canada on the Breast Cancer Task Force of the National Institutes of Health, U.S.A.

Dr. J. E. Morch, Fellow, Council of Cardiology, American Heart Association; Member, Canadian Society for Clinical Investigation.

Dr. M. A. Ogryzlo, Member, Board of Directors, Canadian Arthritis & Rheumatism Society; Chairman, Medical and Scientific Committee, Canadian Arthritis and Rheumatism Society; Chairman, Review Panel, The Gairdner Foundation; Member, Medical Advisory Board, Canadian Hemophilia Society.

Dr. D. Osoba, Member, Council of Ontario Antibody Club.

Dr. R. I. Macdonald, Ll.D. (Honoris causa), Dalhousie University.

Dr. J. F. Paterson, Fellow, Royal College of Physicians (London).

Dr. M. Pflug, Member, American Rheumatism Association.

Dr. D. Schatz, Member, Endocrine Society of the United States; Member, Endocrine Society of Canada; Member, American Thyroid Association.

Dr. J. G. Scott, Certification of the American Board of Internal Medicine.

Dr. G. W. Smith, Member, Canadian Society of Nephrology; Vice-President, Toronto Nephrology Society.

Dr. H. A. Smythe, National Board of Directors, Canadian Arthritis and Rheumatism Society; Member, Research and Scientific Committee, Canadian Arthritis and Rheumatism Society; Medical Advisory Board of Ontario Division, Canadian Arthritis and Rheumatism Society.

Dr. P. G. Walfish, Secretary, Toronto Diabetes Society; Member, Canadian Society for Clinical Investigation; Member, Clinical Research Society of Toronto.

Dr. J. R. Wherrett, Member, Canadian Society for Clinical Investigation; Member, International Neurochemical Society.

Dr. E. D. Wigle, Member, New York Academy of Sciences; Member, American Association for the Advancement of Science.

Dr. D. R. Wilson, President, Toronto Society of Nephrology.

Dr. D. E. Wood, Chairman, Section of Medicine, Academy of Medicine; Vice-President, Eastern Great Lakes Chapter, Society of Nuclear Medicine.

Dr. D. Varadi, Guest lecturer, Annual Meeting, Canadian Dermatologic Association, Vancouver; Member, Society for Investigative Dermatology; Member, American Academy of Dermatology; Member, Canadian Dermatologic Association.

Dr. R. Volpe, Membership Committee, American Thyroid Association; Program Committee, Canadian Society for Clinical Investigation.

Dr. K. J. R. Wightman, Visiting Professor, Memorial University, St. John's, Newfoundland; Visiting Professor, Union Memorial Hospital, Baltimore; Member, Advisory Board, Canadian Society for the Advancement of Therapeutics; Appointed Associate Dean, Head of Division of Postgraduate Medical Education (effective 1 July 1969); Elected to President's Council (effective 1 July 1969).

Dr. T. Zsoter, Member, Canadian Society for Clinical Investigation; Member, American Society of Pharmacology and Experimental Therapeutics.

SCHOLARLY ADDRESSES

Dr. R. Alison, "The New Look in Cancer Education," Cancer Society, Toronto; "The New Look in Cancer Education," Cancer Society, Fredericton.

Dr. R. M. Armstrong, "Nonprogressive Myopathies of Infancy and Childhood," Winnipeg Children's Hospital.

Dr. D. S. Beanlands, "Role of Mechanical Support of the Circulation in Myocardial Infarction," Academy of Medicine, Toronto; "The Coronary Care Unit: Results of Aggressive Management of Acute Myocardial Infarction," Canadian Cardiovascular Society, Vancouver; "Mechanical Support of the Circulation in the Treatment of Acute Myocardial Infarction," American Heart Association, Bal Harbour, Florida; "Harmful Effects of Smoking," Ontario Heart Foundation, Toronto.

Dr. A. J. Becker, "Enzymatic Repair of dna," Division of Pure Chemistry, National Research Council, Ottawa.

Dr. D. E. Bergsagel, "The Improvement of the Animal Tumour Model," Conference on the Critical Evaluation of Cancer Chemotherapy. Sponsored by the American Cancer Society and the International Union Against Cancer, Camden, New Jersey.

Dr. I. Broder, "Histamine Releasing Activity of Rheumatoid and Non-rheumatoid Serum and Synovial Fluid," New York Academy of Sciences Symposium on Rheumatoid Factors, New York; "Autoimmunity," Muskoka Medical Society; "Similar Receptors for Different Types of Antibody Activating Histamine Release in the Guinea Pig," International Symposium on Cellular and Humoral Mechanisms in Anaphylaxis and Allergy; "Pharmacodynamics of Asthma," Ontario Allergy Society; "Correlation Between Clinical Severity, Leukocyte Sensitivity and Serum Blocking Activity in Ragweed Sensitive Persons," American Academy of Allergy, Miami; "Histamine Release by Soluble Antigen-antibody Complexes Containing Non-sensitizing antibody," American Association of Immunologists, Atlantic City.

Dr. K. W. G. Brown, "Changing Perspective in Coronary Units," Academy of Medicine, Summit, New Jersey; "Do Coronary Units Save Lives?" Royal College of Physicians and Surgeons of Canada Ontario Regional Meeting, Windsor; "Aggressive Approach to Management – The Coronary Care Concept," American College of Cardiology Symposium, London, Ontario; "Drug Therapy in Coronary Care 1969," Second National Conference in Coronary Care Units, Denver, Colorado; "Experience with Acute Myocardial Infarction," Annual Meeting, Family Physicians of Canada; "Prevention and Treatment of Cardiac Arrhythmias," Central New York Academy of Medicine, New York; "Power Failure," Second Conference on Coronary Care Units, Rochester, New York; "Acute Myocardial Infarction," Ontario Heart Foundation Symposium, Toronto; "Treatment of Ventricular Arrhythmias," American College of Cardiology, Symposium, New York; "Acute Myocardial Infarction and Coronary Care," Kirkland Lake and District Medical Society, Kirkland Lake; "Organization of the Coronary Unit," Moose Jaw Medical Society; "Treatment of Hypotension and Shock," American College of Cardiology Symposium, New York.

Dr. W. T. W. Clarke, "Proteinuria," Imperial Oil Medical Dept. Conference; "Management of End-Stage Renal Disease," National Defence Medical Centre, Ottawa; "Diet in Uremia," Ontario Dietetic Association Therapeutic Nutrition Workshop; "Office Management of Diabetes," Newfoundland Medical Association Annual Meeting and Conference; "Conservative Management of Chronic Renal Failure," Newfoundland Medical Association Annual Meeting and Conference.

Dr. J. S. Crawford, "Problems of Care in the Elderly," Manitoba Hospital Association; "Shoulder Lesions," North York Branson Hospital, Medical Staff.

Dr. J. H. Crookston, "Hereditary Erythroblastic Multinuclearity with Positive Acidified Serum Test," Duke University, Durham, North Carolina; "Abnormalities of Erythrocyte Membranes in Congenital Dyserythropoietic Anemia with Erythroblastic Multinuclearity," Canadian Society for Clinical Investigation.

Dr. G. A. deVeber, "Medical-legal Aspects of Organ Transplantation," Medical-Legal Society of Toronto; "Immunological and Clinical Aspects of Cardiac Transplantation," Niagara Falls General Hospital Medical Staff; "Immunological and Clinical Aspects of Kidney Transplantation," Manitoba Medical Association and College of General Practice Annual Meeting; "Treatment of Acute Rejection in Cardiac Transplants," Second World Symposium on Cardiac Transplantation; "Progress in Human Organ Transplantation," Deaconess Hospital, Buffalo.

Dr. H. J. Donsky, "Cutaneous Leishmaniasis," First All Canada Meeting of Tropical and Parasitic Diseases and Health, Toronto.

Dr. S. Dubiski, "Antibody Producing Cells as Characterized by Their Products," 11th Annual Meeting of Canadian Federation of Biological Society, Kingston; "Phenotypic Expression of Immunoglobulin Genes; Allotypic Specificity in Produc-

tive, Pre-productive and Progenitor Cells," 5th Meeting of the Federation of European Biochemical Societies, Prague, Czechoslovakia; "Does Antibody Synthesis Involve Somatic Recombination?, Allotypy as a Probe," XVII Annual Colloquium–Protides of the Biological Fluids, Brugge, Belgium.

Dr. S. Epstein, "Management of Respiratory Failure," North Bay Medical Association.

Dr. M. M. Fisher, "Cirrhosis," University of Pittsburgh.

Dr. D. A. Gordon, "Rheumatoid Arthritis," North Bay and District Medical Society; "Acute Hospital Care of the Patient with Arthritis," University of Rochester Medical Center; "Amyloidosis Resembling Rheumatoid Arthritis (r.a.). Secondary to Multiple Myeloma with Bence Jones (b.j.) Proteinuria," Canadian Rheumatism Association, Vancouver; "Arthritis Associated with Hemochromatosis – a Distinct Entity?" Canadian Rheumatism Association, Vancouver; "Amyloidosis Resembling Rheumatoid Arthritis (r.a.), Secondary to Multiple Myeloma with Bence Jones (b.j.) Proteinuria," Regional Meeting for Upstate New York and Ontario of the American College of Physicians, Niagara Falls.

Dr. C. C. Gray, "Chronic Respiratory Diseases," Lambton County Tuberculosis and Respiratory Disease Association, Sarnia; "Chronic Bronchitis and Emphysema," North Bay Tuberculosis and Respiratory Disease Society.

Dr. W. F. Greenwood, "The Clinical Recognition of Coronary Heart Disease and the Problem of Differential Diagnosis," University of Western Ontario.

Dr. J. Harrison, "Studies Before and After Treatment of Metabolic Bone Disease," Canadian Society for Clinical Investigation, Vancouver.

Dr. G. D. Hart, "Endocrinopathies of the Ptolemies," Academy of Medicine, Toronto; "Diagnosis of Disease from Ancient Coins," American Institute of Archaeology Convention.

Dr. R. Hasselback, "Human Leukemia," Ontario Veterinary Association, Toronto.

Dr. M. Hill, "L-dopa," Canadian Parkinson's Disease Association, Toronto.

Dr. A. L. Hudson, "Tropical Diseases," Academy of Medicine, Toronto.

Dr. K. N. Jeejeebhoy, "Tropical Malabsorption Syndrome; Digestion and Absorption of Fats," Third Asian-Pacific Congress of Gastroenterology, Melbourne; "Tropical Sprue," Buffalo General Hospital.

Dr. D. W. Killinger, "Metabolism of Steroid Sulfates in Steroid-producing Tissues," Canadian Society for Clinical Investigation.

Dr. R. G. Lee, "The Relation between Twitch Tension and Action Potential in Plasmocid Myopathy in the Rat," American Academy of Neurology Meeting, Chicago; "Computer Generated Three Dimensional Displays of the Visual Evoked Potential," Canadian Congress of Neurological Sciences, Vancouver.

Dr. M. Lenczner, "Tropical and Parasitic Diseases and Hygiene," Carleton University, Ottawa; "Blood Parasites and their Clinical Entities; Tissue and Intestinal Parasites and their Clinical Entities: Tropical Hygiene; Chemotherapy in Tropical and Parasitic Diseases," University of Laval, Quebec; "Why Foreign Aid; The Problems of Immigrants and Temporary Residents from Tropical, Subtropical and Underdeveloped Countries in our Communities: the Problems and the Proposed Solution; Bilharziasis and Niridazole," First all Canada Meeting on Tropical and Parasitic Diseases and Health, Toronto.

Dr. J. C. Laidlaw, "Glucocorticoid-Remediable Aldosteronism, Internal Symposium on Adrenal Cortex, Aldosterone and Hypertension," Coronado, California; "Aldosterone," Department of Medicine, Howard University, Washington, D.C.; "Use and Mode of Action of Steroids in Treatment of some Hypertensive Diseases," Canadian Society of Chemotherapy.

Dr. D. C. Ley, "Cancer and the Community," Carleton County Unit of the Canadian Cancer Society; "Women in Medicine," Canadian Women's Club, Pembroke.

Dr. J. A. Little, "Serum Lipids in Relation to Pathogenesis, Epidemiology and Clinical Complications of Antherosclerosis," Lipids and Heart Disease Symposium, Excerpta Medica Foundation, Montreal; "Nutrition and Degenerative Vascular Disease; Fats in Human Nutrition Symposium," Nutrition Society of Canada, Canadian Federation of Biological Societies Meeting, Edmonton.

Dr. E. A. McCulloch, "Differentiation of Hematopoietic Stem Cells," XIII Congress of the International Society of Haematology, New York; "Studies of the Control of Haemopoietic Cell Differentiation," Columbia University, New York; "Haemopoietic Stem Cells in Vitro and in Vivo," Western Blood Club, Carmel, California; "Complementary Use of Cell Culture and *In Vivo* Methods for the Study of Hemopoiesis," University of Montreal; "Control of Hemopoiesis at the Cellular Level," Institut de Microbiologie et d'Hygiène de L'Université de Montréal; "Myelopoiesis and Lymphopoiesis Compared at the Cellular Level," Canadian Federation of Biological Studies, Edmonton.

Dr. W. J. McIlroy, "Current Research in Multiple Sclerosis," Annual Meeting of Multiple Sclerosis Society of Canada, Winnipeg; "Changing Views in Multiple Sclerosis," Annual Meeting of Michigan Multiple Sclerosis Society, Detroit.

Dr. W. A. Mahon, "The Cardiovascular Effects of Glucagon in Shock," American Heart Association, Miami Beach; "Epidemiology and Treatment of Degenerative Coronary Artery Disease," Oshawa General Hospital Staff Association and Lincoln Academy of Medicine.

Dr. J. T. Marotta, "Herpes Simplex Encephalitis (Acute Necrotizing Encephalitis)," Canadian Neurological Meeting; "Long Term Study of Tegretol in Tic Douloureaux," Symposium on Facial Pain, New York.

Dr. J. W. Meakin, "Cell Biology of a Transplantable Androgen-Dependent Mammary Tumour in the Mouse," Third International Congress of Endocrinology, Mexico City and to the Canadian Society for Clinical Investigation, Vancouver.

Dr. I. A. Menon, "State of Particulate Tyrosinase in Melanoma," Annual Meeting of the Society of Investigative Dermatology, San Francisco; "Characterization of Tyrosinase in Serum from Melanoma Bearing Mice," Canadian Federation of Biological Sciences.

Dr. J. E. Morch, "Surgery in the Aged—Medical Aspects," Royal College of Physicians and Surgeons of Canada, 5th Ontario Regional Meeting, Port Arthur; "Cardiac Arrhythmias," Medical Alumni Association, Toronto; "Newer Techniques for Investigation of Chest Pain," Academy of Medicine, Toronto; "Cardiovascular Effects of Intravenous Glucagon in Man," 41st Scientific Sessions of American Heart Association, Miami.

Dr. M. A. Ogryzlo, "Diagnosis and Treatment of Gout," College of General Practice, Toronto; "Newer Development in the Treatment of Gout," Western New York and Erie County Medical Society, Buffalo; "Renal Factors in the Production of Hyperuricemia," American Rheumatism Society Workshop, Seattle; "Cryoglobulin Arthropathy" (with Dr. Pruzanski), Canadian Rheumatism Association, Vancouver; "Rheumatoid Arthritis with Plasmacytic Dyscrasia" (with Drs. Pruzanski and Mazzerole), Interurban Arthritis Group, Hamilton.

Dr. J. S. Olin, "Use of the Laboratory and the Management of Bone Diseases," College of General Practice, Toronto.

Dr. D. Osoba, "Control of Cell Differentiation," Annual Meeting of the Canadian Society for Immunology, Kingston; "Control of Cellular Differentiation in the Immunological System," Dalhousie University; "Evidence for Interaction between Cells during Primary Immune Responses in Cell Culture," Annual Meeting of Canadian Society for Clinical Investigation, Vancouver; "Cellular Interaction during Immune Responses," Billings Hospital, University of Chicago; "Control of Differentiation in the Immunological System," American Chemical Society, Minneapolis; "Differentiation and Cellular Interaction in Primary Immune Responses," XVII Annual Colloquium on Protides of the Biological Fluids, Brugge, Belgium.

Dr. W. Pruzanski, "Cryoglobulinemic Arthropathy Syndrome of Cryo-hypervis-

cosity," Canadian Rheumatism Association Annual Meeting, Vancouver; "Paraproteins in the Synovial Fluid," Kennedy Institute of Rheumatology, London, England.

Dr. W. J. Reynolds, "The Rheumatic Disease Unit Concept in Canada," International Congress of Physical Medicine, Montreal; "Reiter's Syndrome," Kenora Medical Clinic.

Dr. D. L. Schatz, "Presentation of Influence of Heparin on Thyroid Function," American Thyroid Association, Washington.

Dr. J. G. Scott, "Red Cell Enzyme Defects," Canadian Society of Technologists.

Dr. H. A. Smythe, "Diffusion and Perfusion in the Rheumatoid Lung," Interurban Arthritis Meeting; "Recent Advances in Clinical Assessment of Rheumatoid Arthritis," V International Congress of Physical Medicine, Montreal; "Rheumatoid Spondylitis; Articular and Systemic Manifestations," Annual Symposium on Rheumatic Diseases, Cleveland; "Ankylosing Spondylitis," Case Western Reserve University, Cleveland.

Dr. G. Steiner, "The Nervous Control of Brown Adipose Tissue Metabolism," International Symposium on Cold and Altitude Physiology, Aspen, Colorado; "Sympathetic Regulation of Brown Adipose Tissue Metabolism," Canadian Federation Meeting, Edmonton.

Dr. J. T. Suero, "An Acid-base Oriented Algorithm," Toronto Gas Club.

Dr. O. Veidlinger, "Treatment of a Case of Subacute Inclusion Body; Encephalitis with the Anti-viral Agent BUDR," Canadian Neurological Society Meeting.

Dr. R. Volpe, "The Lack of Influence of Alterations of Thyroxine Binding Globulin on the total Triiodothyronine Concentration," Canadian Society for Clinical Investigation, Vancouver; "The Effects of Alterations of Thyroxine Binding Globulin on Triiodothyronine Concentration and Kinetics," American Endocrine Society, New York.

Dr. B. Webster, "The Radioimmunoassay of Human TSH," Symposium on Radioimmunoassays sponsored by National Research Council of Great Britain, London, England; "The Specificity of TSH Antisera," VIIth Acta Endocrinologica Congress, Stockholm.

Dr. E. D. Wigle, "Left Ventricular Cineangiographic Observations in Muscular Subaortic Stenosis," Canadian Cardiovascular Society, Vancouver; "Pharmacodynamics of Mitral Regurgitation," Canadian Society for Clinical Investigation, Vancouver and Tricity Cardiology Meetings, Buffalo; "Effect of Medical Research on Medical Education," Canadian Medical Association, Toronto; "Left Ventricular Outflow Tract Obstruction," St. Paul's Hospital, Vancouver.

Dr. J. K. Wilson, "Rehabilitation Following Cardiac Transplantation," Second World Symposium on Heart Transplantation, Montreal.

Dr. C. R. Woolf, "The Effect of Carbon Dust Inhalation," Fourth Annual Symposium on Air Pollution and Respiratory Disease, Buffalo; "Self Air Pollution by Cigarette Smoke in Women," Fourth Annual Symposium on Air Pollution and Respiratory Disease, Buffalo; "Possible Clinical Roles of Oxygenators," Toronto Gas Club; "Is Cigarette Smoking Bad for Women?" Ontario Tuberculosis and Respiratory Disease Association Semi-annual Meeting; "Simplified Office Pulmonary Function Testing," College of General Practice Annual Scientific Meeting, Toronto; "Assessment and Treatment of Chronic Bronchitis and Emphysema in General Practice," College of General Practice Sixth Annual Scientific Meeting, Toronto; "Respiratory Care Unit," American College of Chest Physicians Pulmonary Emphysema Symposium, Niagara Falls; "Principles of Respiratory Care—Design of a Respiratory Care Centre," Seminar on Chronic Obstructive Pulmonary Disease, Plainview, New York; "Respiratory Effects of Cigarette Smoking in Women," Ontario Thoracic Society Eighth Annual Meeting, Toronto.

Dr. K. J. R. Wightman, Dalhousie University Centennial Symposium, "The Learning Process," College of General Practice Annual Meeting, Toronto; "Antibiotics: Indications and Dangers"; Hamilton Academy of Medicine, "Rational Therapy"; Canadian Society for Chemotherapy, "Modern Aspects of Chemo-

therapy"; Postgraduate Course, Surgery, St. Michael's Hospital, "Antimicrobial Therapy."

DR. D. M. YOUNG, "Service Responsibilities of Clinical Chemists," American Association of Clinical Chemists and Canadian Society of Clinical Chemists, Washington; "Health Service Delivery Systems—Analytical Techniques," Ontario Society of Medical Technologists, Sudbury; "Research Project of the Canadian Association of Pathologists: An Outline with some results—their implications as to cost," American Society of Clinical Pathologists, Miami; "Approach to Multiple Clinical Screening at Toronto General Hospital," Lincoln County Academy of Medicine; "Multiple Screening Procedures," Western New York Society of Pathologists, Niagara Falls, N.Y.; "Multiple System Chemical Profiles," Niagara Falls Academy of Medicine.

PUBLICATIONS

ADELMAN, A. G., and WIGLE, E. D. "Two Types of Intraventricular Pressure Difference in the Same Patient. Left Ventricular Catheter Entrapment and Right Ventricular Outflow Tract Obstruction" (*Circulation*, vol. 28, no. 4, 1968, pp. 649–55).

——— "The Bradycardia Tachycardia, Asystole Syndrome: Treatment by a Pacemaker" (*Canadian Medical Association Journal*, vol. 100, no. 2, Jan. 11, 1969, pp. 75–7).

ANGEL, A. "Brown Adipose Cells: Spontaneous Mobilization of Endogenously Synthesized Lipid" (*Science*, vol. 163, Jan. 1969, pp. 288–90).

AYNACIYAN, A. V., and BINGHAM, J. R. "pH of the Duodenum of Patients with and without Duodenal Ulcers measured with a Radio Telemetering Capsule" (*Gastroenterology*, vol. 56, no. 3, March 1969, pp. 476–82).

BERGSAGEL, D. E. "Chemotherapy of Cancer" (*Modern Medicine*, vol. 24, 1969, pp. 19–24).

——— "The Treatment of Plasma Cell Myeloma" (*Current Therapy*, 1969, pp. 282–5).

BERGSAGEL, D. E. *et al.* "Committee of the Chronic Leukemia-Myeloma Task Force, National Cancer Institute: Proposed Guidelines for Protocol Studies. II. Plasma Cell Myeloma" (*Cancer Chemotherapy Reports*, part 3, vol. 1, Dec. 1968, pp. 17–39).

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CLARKE, W. T. W. "Diabetes Mellitus: Management with Diet, Insulin and Drugs" (*Canadian Family Physician*, vol. 14, no. 12, Dec. 1968, pp. 31–5).

CROOKSTON, J. H. "Transfusion Reactions" (*American Journal of Medical Technology*, vol. 34, 1968, p. 579).

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DEVEBER, G. A., and SCHATZ, D. L. "Effect of Hemodialysis on Thyroid Function" (*Proceedings, European Dialysis and Transplant Association*, vol. 5, 1968, pp. 226–30).

DIAMANT, N. E., and BORTOFF, A. "Effects of Transection on the Intestinal Slow Wave Frequency Gradient" (*American Journal of Physiology*, vol. 216, 1969, p. 734).

——— "The Nature of the Intestinal Slow Wave Frequency Gradient" (*ibid.*, pp. 301–7).

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monary Embolism possibly due to Oral Contraceptive" (*Canadian Medical Association Journal*, vol. 100, no. 2, Jan. 1969, pp. 78–80).

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OBSTETRICS AND GYNAECOLOGY

Under the direction of Professor W. M. Paul

Members of the department have continued their work in development of the new curriculum, particularly in the system of Reproduction and Neonatology. Plans for Period III are complete and those for Period II far advanced.

With the Division of Postgraduate Medical Education, a refresher course for general practitioners and a refresher course for specialists was presented.

However, a major activity of the department as a whole has been administrative rather than academic. I refer to the great amount of time devoted to the development of plans and proposals for this department and the school as a whole with respect to hospital facilities, staff, and the relationship of the university to the hospitals. Since staff find themselves in the position of serving in both these spheres, these policies are of great importance to them. The problems are certainly not resolved, and next year's report will probably contain similar remarks. However, I would like to acknowledge the assistance given me by the staff as a whole with much good sense, and more good faith. In particular, I would acknowledge the help of the division heads in establishing sound bases for our planning.

We are pleased to welcome Dr. John Whiteside to our department at the Toronto Western Hospital. A former fellow, Dr. Whiteside undertook training at the University of North Carolina and the Bowman Gray School of Medicine for two years before returning. His particular interest is in human myometrial function. In January, 1969, we were fortunate in having Dr. Paul McCleary join our staff at St. Michael's Hospital. Dr. McCleary was trained at Cornell and will pursue his interest in gynaecologic oncology. Dr. Scott Russell has resigned from the department, after four years of service at the Toronto Western Hospital, to join the staff of the North

York Hospital. He has made a valuable contribution to this school during this time, and I wish to acknowledge his loyal service and wish him well in his new post.

Dr. A. Shewchuk, Dr. R. Gall, Dr. C. A. Cowell, and Dr. A. H. Gerulath were made Fellows of the Royal College of Surgeons of Canada. Dr. Cowell has been awarded an Ontario Scholarship for further study in London, England, during the coming year.

Dr. Richard Wilson, seconded from our department for another year, remained as Director of the Health Sciences Functional Planning Unit, while continuing his research activity in our department.

Dr. Saul Cohen became a member of the Institute of Medical Sciences.

RESEARCH

Dr. P. F. Beirne has directed the development of ultrasonic diagnostic techniques in Obstetrics and Gynaecology for the past two years. This expensive development is now available for the use of our whole department.

Dr. Rudi Borth continues his examination and development of assay methods for human gonadotrophins, as well as a clinical study of HCG excretion following hydatid mole. With Dr. C. A. Woolever and co-workers he has collaborated in methodological problems in the assay of blood steroids by competitive protein binding and double isotope derivative methods.

Dr. Saul Cohen continued his studies on estrogens in human pregnancy urine. He has demonstrated a consistency of proportion of estriol to all other estrogens during pregnancy which appears to be disturbed by labour, as evidenced by an increase in the estradiol fraction and/or a decrease in estriol formation. Additional experiments have indicated an inhibiting effect of added estriol to the potentiation of activity of relaxin on uterine muscle afforded by estradiol. Finally, he is investigating the increased efficiency of large Sephadex columns for the separation of estrogens with a view to the determination of all estrogens in pregnancy urine.

Dr. T. A. Doran, with Dr. P. Conen, has undertaken studies in cell culture from human amniotic fluid, with a view to the prediction of genetic defects on a cytologic and biochemical basis. He continues his evaluation of endometrial lavage as a screening procedure for endometrial cancer.

Dr. D. J. Gare with Dr. Max Baldwin supervised a continuing area of development in fetal assessment and therapy during labour using fetal EKG and scalp sampling techniques.

Dr. J. W. Goodwin and Dr. J. E. Milligan are continuing their studies on the fetal lamb in utero in the interim facilities for large animal research at the former Ontario Research Foundation. This work includes studies on the reflex control of the renal circulation of the fetal lamb.

Dr. J. E. Morgan has been active in the investigation of mechanisms in female incontinence and with the development of sling procedures using prostheses in its correction.

Dr. L. Organ has been instrumental in developing monitoring techniques for fetal heart rate and uterine activity.

Dr. Fred Papsin continues his work on the use of colposcopy in the assessment of cervical dysplasia.

Dr. C. S. Russell participated in the development of pneumogynography as a diagnostic tool.

Dr. T. G. Ryley continues the screening of sex chromatins in newborn amnion, and also participated in chromosomal analysis in certain groups of patients at the request of the Addiction Research Foundation.

Dr. G. Urbach continues studies in the immunologic relationships of trophoblast to the maternal organism, involving the reaction of maternal lymphocytes to trophoblast in cell culture.

Dr. Richard Wilson directed projects in estrogen replacement in the perimeno-

pause, health care delivery to a designated population in downtown Toronto, and in the role of the fetal adrenal in the synthesis of estrogen.

SCHOLARLY ADDRESSES

Dr. Rudi Borth, "Chorionic Gonadotrophin," Second Postgraduate Course in Endocrinology of Pregnancy, San Juan, Puerto Rico, October 1968; "Statistics in Endocrinology," University of Michigan, Gardner M. Riley Memorial Lecture, Ann Arbor, March, 1969; "Parameters for the characterization of radioimmunoassay systems," 7th Acta Endocrinologica Congress, Stockholm, Sweden, June 1969.

Dr. Saul Cohen, "The Excretion of Total Estrogens in Pregnancy Urine," Third International Congress of Endocrinology, Mexico City, July 1968.

Dr. T. A. Doran, "Creatinine Uric Acid and Electrolytes in Amniotic Fluid," Society of Obstetricians and Gynaecologists of Canada, Toronto, June 1969.

Dr. D. J. Gare, "Oxygen Administration During Labour," Royal College of Physicians and Surgeons of Canada Annual Meeting, Vancouver, January 1969.

Dr. W. J. Hannah, "Diabetes in Pregnancy," Royal College of Physicians and Surgeons Regional Meeting, Windsor, November 1968; "Hazards of oral contraceptives," Annual Meeting, Canadian Medical Association, Toronto, June 1969.

Dr. J. E. Morgan, "A sling operation using Marlex Polypropylene Mesh for the treatment of Recurrent Stress Incontinence," Society of Obstetricians and Gynaecologists of Canada, Toronto, June 1969.

Dr. W. M. Paul, "Considerations in Attracting Students to Obstetrics and Gynaecology," Association of Professors of Obstetrics and Gynaecology of America, New Orleans, February 1969; "Postgraduate Training and Health Needs," Royal College of Physicians and Surgeons of Canada Regional Meeting, Windsor, November 1968.

Dr. G. I. Urbach, "Maternal-Placental-Foetal Immunological Relationships," The Searle Lecture, Canadian Society for the Study of Fertility, Toronto, June 1969.

Dr. Richard Wilson, "Hormones and the Menopause," "Urinary Estrogen Excretion during Pregnancy," University of Saskatchewan, Saskatoon, Feb. 1969; "Systems Analysis in Health Sciences Education Planning," Association of Canadian Medical Colleges Annual Meeting, Halifax, September 1969; "Planning for Medical School Facilities," American Association of Medical Colleges Conference, Chicago, January 1969; "Systems Analysis for Efficient Resource Allocation in Higher Education: A report on the Development and Implication of CAMPUS techniques" (with R. W. Judy, J. B. Levine and S. I. Centner), The Organization for Economic Cooperation and Development Conference on University Planning and Management Models, Paris, France, April 1969; "Resource Implications of Alternative School Curricula," Case Western Reserve University, School of Medicine, Cleveland, Ohio, May 1969.

PUBLICATIONS

Bean, J. L. M., Whetham, J. C. G., and Vernon, C. P. "Results of Surgical Treatment of Carcinoma of the Cervix" (*American Journal of Obstetrics & Gynaecology*, vol. 103, Feb. 1969, pp. 465–70).

Borth, R. "A Terminology for Units of Biological and Immunological Activity" (*Acta Endocrinologica*, vol. 60, no. 1, Jan. 1969, pp. 1–3).

Borth, R., and Menzi, A. "Effect of Freezing and Thawing and of Diluent on the Potency of Human Chorionic Gonadotrophin in three Methods of Bioassay" (*Acta Endocrinologica*, vol. 61, no. 1, May 1969, pp. 39–95).

Borth, R., Menzi, A., and Vuagnat, P. "Approximate versus Exact Evaluation of Bioassays based on Quantal Response" (*Acta Endocrinologica*, vol. 60, no. 2, Feb. 1969, pp. 216–20).

Cohen, S. L. "Removal of Substances Interfering with the Rapid Assay of Estrogen in Pregnancy Urine" (*Journal of Clinical Endocrinology*, vol. 29, no. 1, Jan. 1969, pp. 47–54).

HANNAH, W. J. "Use of Oxytocin in Modern Obstetrics" (*Applied Therapeutics*, vol. 11, no. 4, April 1969, pp. 216–20).
MORGAN, J. E. (with Hodgkinson, C. P.) "Basic Pressures of Voiding in the Adult Female" (*American Journal of Obstetrics & Gynaecology*, vol. 103, no. 6, March 1969, pp. 755–72).
PAUL, W. M. "Pain Relief in Labour and Delivery"; in *Controversy in Obstetrics and Gynaecology*, pp. 191–4. Philadelphia: W. B. Saunders, 1969.
URBACH, G. I. (with Greene, L.) "Maternal-Placental-Fetal Relationships" (*Canadian Medical Association Journal*, vol. 99, no. 10, Sept. 14, 1968, pp. 469–71).
WHITESIDE, J. H. "Myometrial Effects of Exogenous Estrogen and Progesterone in the Castrate Monkey" (*Annals of the Royal College of Physicians and Surgeons of Canada*, vol. 2, Jan. 1969, p. 40).
WHITESIDE, J. H. (with Brame, R. G., and McGaughey, H. S.) "Foetal-Maternal Exchange of Sodium II" (*Obstetrics and Gynaecology*, vol. 33, April 1969, p. 511).
WILSON, R. "Obstetrics and Gynaecology: A Challenge" (*University of Toronto Medical Journal*, vol. 46, no. 3, Jan. 1969, p. 3).
WILSON, R. (with Walter, J. R., Centner, S., and Wolfson, W.) "Systems Analysis in Health Sciences Education Planning" (*Canadian Medical Association Journal*, vol. 100, no. 15, April 19, 1969, p. 715).

OPHTHALMOLOGY

Under the direction of Professor Clement McCulloch

Restructuring of the undergraduate teaching programme in Ophthalmology was the major project in the Department during this academic year. During their final medical year the undergraduate students will spend two weeks in the Eye Departments of the teaching hospitals. During this period a structured programme has been developed to give the students some understanding of the main problems of Ophthalmology. It is hoped that by continuing contact with the patients the student will learn to apply the academic content of the course to the treatment of disease. A continuous evaluation of the student during these two weeks will be attempted in the hope that the Period will be one of progressive accomplishment. The planning and completion of such a programme has involved a major part of the staff of the Department.

The Department is also offering two teaching sessions in Period II of the new curriculum and redevelopment of the material in Ophthalmology for this purpose has been completed.

The graduate programme in the Department has taken on new significance with the acceptance by the University of the Diploma in Ophthalmic Science. This is now available to those taking the regular graduate programme in Ophthalmology and will give the students University recognition. At the same time, the graduates will be required to take the examinations of the Royal College of Physicians and Surgeons of Canada for the Specialty to gain recognition to practise as in the past. These two potential forms of recognition will be of value to the graduates both in the field of academic ophthalmology and of practice.

During the first year of the graduate programme, the men are supported by a Fellowship and do not have a major service commitment in the hospitals. They receive regular lectures and assignments and have a research project, under the guidance of our research staff. In the Spring a report of their project is presented at the Annual Research Meeting in competition for the John Gaby Prize.

In the second and third years the men work in the five University teaching hospitals in a progressive programme. During the second year their work is concentrated mainly on clinical ophthalmology and in the third year the emphasis is on surgical ophthalmology. At the end of the third year each presents a paper at the Annual Clinical Meeting of the Department in competition for the Alumni Prize.

The following first-year Fellows were supported through the Departmental budget: Drs. D. M. Anderson, W. G. Macrae, D. M. Jamieson, A. L. Townsend,

F. Simon, G. E. M. Kirker, A. L. Maberley, and T. P. Fejer. Drs. S. S. Smith and R. C. Frecker were supported by the Edward Christie Stevens Foundation.

The second-year men rotating through the teaching hospitals have been as follows: Drs. W. S. Dixon, W. M. Easterbrook, J. R. Buncic, D. G. Middleton, B. P. Sniderman, R. D. West, and P. Migasena.

The residents in the final year of the programme were as follows: Drs. D. R. Smith, M. Cooper, C. G. Falkner, M. Priest, P. D. Chubb and G. J. Johnson.

It should be mentioned that the Department is assisting Hamilton Civic and St. Joseph's hospitals in Hamilton in their Ophthalmology teaching programme. Drs. R. M. Zahoruk and T. P. Prawak, who completed their first basic science year in Toronto, are now concluding their second year of the programme in Hamilton. It is planned to send two men each year from the first year of the Toronto programme to Hamilton.

Dr. Frederick Feldman has completed his year in glaucoma research with Dr. S. M. Drance of the Department of Ophthalmology, University of British Columbia, and will return to the teaching staff of the New Mount Sinai Hospital, July 1, 1969.

The Department held a number of meetings during the year:

The 11th Walter Wright Lecture was given on January 17th. Dr. Barrie R. Jones of the Institute of Ophthalmology, London, England gave the Lecture on "Problems in Herpetic Keratitis." The rest of the day was given over to papers from the clinical staff. Mr. John Winstanley of St. Thomas's Hospital, London, enhanced the programme with his paper, "Making Levator Resection Easier in Ptosis Correction." A Grand Ward Rounds was held the following Saturday morning at St. Michael's Hospital.

On February 27 and 28 a course in Ophthalmology for General Practitioners was given by the Department under the direction of Dr. D. W. Harper. This course continues to be successful and to attract a number of practitioners. This year 32 general practitioners attended and 30 members of the staff were involved with the presentations. Live material was used as much as possible, and an attempt was made to give exact details of diagnostic procedures and therapeutic management of cases.

The annual Clinical Course was held April 17 and 18 and was devoted to the subject of Neuro-ophthalmology. This was under the direction of Dr. Lois Lloyd and was the largest course put on by the Eye Department, with 102 registered. The guests of honour were Professor Frank B. Walsh of Baltimore who spoke on "Progressive Unilateral Loss of Vision" and "Primary Ocular Myopathy"; Dr. W. F. Hoyt of San Francisco who discussed "Papilledema" and "Posterior Cerebral Artery – Neuro-radiologic/Neuro-ophthalmologic Correlations." Dr. T. P. Kearns of the Mayo Clinic in Rochester spoke on "Motor Anomalies of the Eye in Neurological Disease" and "The Ophthalmologist and Carotid Occlusive Disease." The following Saturday morning a ward rounds on Neurologic problems was held. This, combined with the course, gave a thorough review of recent advances in the subject. The staff of many other Departments of Neurology and Ophthalmology across Canada participated in the programme and we are grateful for their assistance.

The Annual Departmental Research Meeting and Clinical Day were held May 9 and 10. Dr. John Locke, Professor of Ophthalmology at McGill, was the guest for the Clinical Day. He discussed "Further Studies of the Viscosity of Aspirated Vitreous Fluid" and "A New Diagnostic Approach to Vertical Muscle Imbalance." The senior residents presented clinical papers. Drs. D. R. Smith and G. J. Johnson shared the Alumni Prize for their papers on "Respiratory Monitoring during Neuraleptic Analgesia" and "Tonography in Infants." A number of the clinical staff also presented papers.

Dr. T. S. Leeson, Professor and Chairman of the Department of Anatomy, University of Alberta, was the guest for the Research Meeting. He spoke on "Development of Choriocapillaris, Pigment Epithelium and Outer Segments of Retinal Rods" and "Freeze Etching of Frozen Outer Segments of Rat Retinal Rods." A number of the research staff and first-year Fellows presented their work. The John

Gaby Prize for the best paper by a Fellow was awarded to Dr. D. M. Anderson for his paper on "Effects of Long Posterior Ciliary Artery Occlusion in the Rabbit." Other guests who participated in the meeting included Dr. H. Werner of Montreal who spoke on "Effect of pO_2 on the Accumulation of -amino-isobutric Acid 14C and 86 Rb by Rabbit Lens in Vitro," Dr. J. G. Fowler of Buffalo who discussed "Squamous Cell Carcinoma of Conjunctiva," Drs. E. Shubert and M. J. Hollenberg of London, Ontario who spoke on "Localization of Gammal Crystallin in the Developing Rat Lens," Drs. D. J. McCallion and Patricia Diamond of Hamilton on "Tissue Culture of Embryonic Pigmented Retina," and Dr. C. G. Smith of the Department of Anatomy who spoke on "The Misnamed Medial Palpebral Ligament in Horizontal Section."

One of the important developments during the year was the expansion of the work done in the teaching hospitals. A new clinic has been constructed at Sunnybrook Hospital which embodies a concept different from that previously used. Patients will be seen in facilities equal to those normally offered to private patients. A similar interim development of the Clinic at the Hospital for Sick Children is going on and will provide comparable facilities for all patients at that hospital.

The Ophthalmic Pathology Laboratory has continued to be active this year. Specimens numbering 233 have been received during the year for study. The laboratory also processes any research pathology that is required by the staff, much of this being special preparations. The number of research specimens processed this year was 242. The staff of the Department continues to support the Canadian Ophthalmic Pathology Study Club and, with the help of Miss E. Forster, presented material at the annual meeting in London, Ontario.

The Department would like to thank the many people who have contributed to our work this year, either through support of staff or purchase of equipment. Mrs. H. B. Stapells and her family have continued to support the Stapells Fund. Dr. John Parker has received Stapells support during the year and we are most pleased that in future it will be possible to support as many as three Fellows taking advanced postgraduate training, through the Stapells Fund.

The Selkirk Fund has continued to be a source of support to the Department, as have the Alumni.

The Ontario Geriatric Society has given us a generous grant towards the continuing study of micro vascular changes in the retina. This has enabled us to purchase an automatic microtome.

Through a grant from the Medical Research Council a liquid scintillation counter was obtained for Dr. Matuk's work on production of protein in the outer segments of the rods and cones. The Independent Order of Odd Fellows has continued to support Dr. Matuk during the year. The Lions Club of Ontario has also donated an Ice-making Machine to be used in connection with Dr. Matuk's research.

Through the generosity of the Manny B. Kerbel Fund, an ultrasonic ophthalmoscope was purchased for use in the work of Dr. Martin Kazdan on ultrasound diagnosis of eye problems at the Toronto General Hospital.

We are grateful for a bequest from the Gertrude I'Anson Estate for Research in Ophthalmic Problems and also for many other small contributions that have continued to come in.

RESEARCH

Under a Medical Research Council grant entitled "Immunological studies on the cornea," Dr. P. K. Basu, assisted by Mrs. I. Fielding and Mr. F. Carre, continued studies on the immunological problems related to corneal transplantation. They are particularly interested in establishing *in vitro* models for testing various possible factors involved in graft destruction. Dr. S. S. Smith and Dr. Basu have studied the role of mast cells in corneal reaction to heterologous grafting. Dr. Basu and Mrs. Fielding are also studying the immunological problems connected with ocular cryosurgical procedures.

Under a National Health Research Grant entitled "Artificial Cornea," Drs. B.

Zucker, M. Kaur, and P. K. Basu, with the assistance of Mr. F. Sanger, have continued their work on development of the artificial cornea. Their work has been concentrated on animals and the basic problems of rejection.

With the support of a Medical Research Council grant entitled "Biosynthesis of Proteins in the Retina," Dr. Y. Matuk, with Mrs. T. Nguyen-tan and Mr. M. Subhani, is working on the mechanism of protein synthesis in the retina. They have found that retinol and retinal stimulate the incorporation of radioactive leucine into the ribosomal proteins of retina and liver. This incorporation is dependent on the addition of an external source of energy and can be inhibited by puromycin.

Under a National Health Grant entitled "Clinical Investigation of Ideopathic Retinal Detachment," Drs. M. Shea and T. P. Fejer are studying the effects of directly applied alternating current on rabbit retinal vessels. Under the same grant, Drs. C. B. Mortimer and R. C. Frecker are using fluorescein photography for a clinical study of patients with diabetic retinopathy. Drs. L. D. J. Chisholm and A. L. Maberley have also continued studies on the effect of fibrinolytic agents on vitreous haemorrhage.

National Health Grant "Diabetic Retinopathy, its Prevention and Treatment" has supported Drs. H. R. Hausler, G. E. M. Kirker, and T. M. Sibay, aided by Miss B. Stachowska, in their continued basic and clinical research on the retinal complications of diabetes. The influence of accelerated aging, hypoxia, and vasopathic diets was studied in both normal and diabetic experimental animals. Clinical investigations, including a double blind study, were carried out at the Eye Outpatient Department of the Toronto Western Hospital.

With the assistance of a grant from the Medical Research Council entitled "Studies on the Aging Process of the Chorio-retinal Vascular Systems" and a grant from the Ontario Geriatric Research Society, Drs. H. R. Hausler, M. Ghosh, and P. K. Basu are studying the effects of aging on ocular blood vessels in the animal and human eye.

Drs. J. S. Speakman and D. M. Jamieson, supported by National Health Grant "Prevention of Blindness from Glaucoma," have developed a technique for accurately measuring the corneal diameter which may be useful in assessing the progress of patients with congenital glaucoma.

The Glaucoma Clinic continues to perform a valuable function at the Toronto General Hospital, under the direction of Dr. Speakman. At the same hospital, under the direction of Dr. Speakman, the Tonography Laboratory and the Tonometer Testing Station are operating under the supervision of Mrs. T. Lacroix.

Also under the grant "Prevention of Blindness from Glaucoma," Dr. R. K. MacDonald is progressing in his work on the application of setons in glaucoma. He is also making a clinical investigation on the use of siliconized virgin silk sutures in the treatment of glaucoma. The sutures are left across the limbus under a flap of conjunctiva so that they lie partly inside and partly outside the anterior chamber. Under the same grant Drs. J. D. Morin and D. M. Anderson are studying the effect of long posterior ciliary artery occlusion in rabbits.

With the help of a Defence Research Board grant, Dr. J. A. Parker is continuing investigation of stereopsis in a noisy background. With the assistance of Dr. F. Simon, he is making a study on the correlation of aqueous index of refraction and protein in the quantitative assessment of flare. He is also evaluating the non-homogenous and aspheric properties of the crystalline lens.

The Eye Bank (Ontario Division) is an integral part of our laboratories. This is a joint project with the Canadian National Institute for the Blind, under the direction of Dr. G. A. Thompson. Mrs. A. Wolf is continuing her work as the Executive Secretary. Since the beginning of the Eye Bank programme in 1955, 3,787 eyes have been donated and 1,900 have been used for corneal transplants. Donor cards have been signed by 42,400 people to date. In 1969, to May 1, 180 eyes have been received and 92 corneal transplants performed.

Since April, 1966, the Eye Bank Laboratory at the University of Toronto, under the direction of Dr. P. K. Basu, has been financially supported by the Ontario Hospital

Services Commission. This laboratory, operated mainly by Mrs. Wolf and Mrs. Fielding, deals with the selection and sterilization of donor eyes.

The Corneal Clinic operates twice monthly at the Toronto General Hospital, under the supervision of Dr. Thompson.

The work of the Eye Bank continues to grow. Not only are more eyes being received but, with improved surgery techniques, the indications for corneal transplants have expanded and the number of transplantations being done is increasing. In addition, the Eye Bank has been performing a larger function in assisting eye banks in neighbouring districts.

In addition to its corneal work, the Eye Bank is supplying vitreous for vitreous transplantation and is now developing a technique using cobalt sterilized fascia lata for repair of ptosis and other plastic procedures about the eyes and lids.

Dr. W. G. Macrae, Dr. M. Willinsky of the Department of Pharmacology, and Dr. P. K. Basu have completed an animal study on corneal injury caused by an aerosol irritant projector containing alpha-chloracetophenone, the active ingredient in some of the riot-control gases.

A number of research projects have also been undertaken by the clinical staff of the Department. Dr. L. Lloyd has continued her studies on neuro-ophthalmologic problems at the Eye Clinics of the Toronto General and the Sick Children's hospitals. Drs. Thompson and Basu, assisted by Dr. K. Subramanian, a Colombo Plan Fellow from India, are investigating the cellular response of conjunctiva following keratoplasty and cataract extraction. Dr. Thompson is carrying on a study of a family with a particular type of corneal dystrophy.

At the Hospital for Sick Children Dr. H. P. Brent and Dr. P. D. Chubb are surveying a group of patients with learning difficulties who have been followed for five years. They are also investigating the prognosis of dyslexia.

Dr. J. S. Crawford is investigating the results of treatment of congenital fibrosis syndrome. He is also studying the tensile strength of stored human fascia lata strips and, with Dr. A. L. Townsend, the histology and tensile strength of fascial strips before and after implantation in the rabbit.

Dr. W. S. Hunter has undertaken an investigation of the capability of the Kretz Ultrasonoscope to discriminate various interfaces which might be encountered clinically within the eye, such as aqueous-vitreous, aqueous-blood, vitreous-blood, and vitreous foreign body, etc.

Dr. M. Shusterman is conducting clinical research projects on retinal detachment in children, laser photocoagulation, ocular allergy to suture materials, and intraocular lenses for aphakia.

Dr. Clement McCulloch has pursued the study of a family with choroideremia, particularly in relation to the toxic effect of the alcohol form of retinene on the pigment epithelium of retina.

Dr. M. Cooper, under the direction of Dr. R. K. MacDonald, has been investigating improved filtering procedures for glaucoma.

Dr. C. G. Falkner, with Dr. M. Shea, has been studying the outflow facility of eyes following surgery for retinal detachment. Drs. D. M. Anderson and J. D. Morin have undertaken a study of factors causing rubeosis iridis.

Dr. M. S. Kazdan has been investigating the diagnostic use of ultrasound for retro-ocular diseases. Dr. Bernard Teichman has developed a new operation for stenosis of lacrimal canaliculi.

HONOURS

Dr. Clement McCulloch is Editor of the *Transactions of the American Ophthalmological Society* and a Member of that Society. He is on the Executive of the Microsurgical Study Club, and is Chairman of the Medical Advisory Board of the Toronto General Hospital.

Dr. R. G. C. Kelly is President of the Canadian Ophthalmological Society and on the Executive of the Pan American Association of Ophthalmology.

Dr. J. S. Crawford is Vice-Chairman of the Medical Advisory Board of the Hospital for Sick Children and Chairman of the Canadian Orthoptic Council.

Dr. G. A. Thompson is National Consultant Ophthalmologist for the Canadian National Institute for the Blind, Medical Director of the Eye Bank of Canada (Ontario Division), and Chairman of the Eye Bank Committee for the Canadian Ophthalmological Society.

Dr. Harold A. Stein is Chairman of the Section of Ophthalmology, Ontario Medical Association.

Dr. Michael Shea is a member of the Retina Society of North America.

Dr. W. S. Hunter is Director of the Association of Ophthalmic Assistants.

SCHOLARLY ADDRESSES

Dr. Clement McCulloch, "Choroideremia," American Ophthalmological Society, Virginia; "Retinitis Pigmentosa," Canadian Ophthalmic Pathology Study Club at London, Ontario; "Basic Science Teaching," Conference on Training in Postgraduate Ophthalmology of the Royal College of Physicians and Surgeons, Vancouver.

Dr. Joseph C. Hill, "Socket Repair," American Academy of Ophthalmology and Otolaryngology, Chicago; "Orbital Fracture Problems," Rochester Ophthalmological Society, Academy of Medicine.

Dr. D'Arcy Macdonald, "Therapeutic Uses of Scleral and Corneal Contact Lenses," Canadian Ophthalmological Society.

Dr. J. S. Speakman, "The Clinical Teaching Unit in Ophthalmology," Conference on Training in Postgraduate Ophthalmology of the Royal College of Physicians and Surgeons, Vancouver.

Dr. P. K. Basu, "Ophthalmic Research Programme at the University of Toronto with particular reference to Corneal and Eye Bank Research," West Bengal Ophthalmological Society Annual Meeting, Calcutta, India, October 26, 1968; "A Study of Corneal Graft Reaction using Tissue Culture Methods," Association for Research in Ophthalmology, Anatomy Section, Sarasota, Florida, April 20, 1969.

Dr. H. R. Hausler, "Diabetic Retinopathy, Newer Concepts of its Pathology and Treatment," Second Hoechst Diabetic Workshop, Mont Gabriel, Quebec, October 28, 1968.

Dr. W. S. Hunter, "The Pathology of Primary and Secondary Open Angle Glaucoma," State University of New York, Buffalo; "Carcinoma of the Sweat Gland," Eastern Ophthalmic Pathology Society, Montreal; "Hemolytic Glaucoma," American Academy of Ophthalmology and Otolaryngology, Chicago.

Dr. Y. Matuk, "Properties of a Protein Synthesizing Cell-free System obtained from Beef Corneal Epithelium," Canadian Federation of Biological Societies, Biochemistry Section, Kingston, Ontario, June 13, 1968.

Dr. C. B. Mortimer, "Symposium on Treatment of Diabetic Retinopathy," American Public Health Service, Virginia.

Dr. J. A. Parker, "Quantitative Analysis of Flare by Refractive Index," Canadian Ophthalmological Society, Halifax.

Dr. Michael Shea, "Cryofixation with Vitreous Excision," First International Symposium on Ophthalmology, Johannesburg, South Africa; "Cryosurgery of Vitreous Touch," Society for Cryosurgery, Miami, Florida; "Epithelial Downgrowth following Cataract Extraction," Canadian Ophthalmic Pathology Study Club, London, Ontario.

Dr. G. A. Thompson, "Superficial Corneal Dystrophy," Canadian Ophthalmological Society, Halifax.

PUBLICATIONS

Basu, P. K., and Carre, F. "Studies on Cellular Viability and Graft Reaction with Corneae treated with Dimethyl Sulfoxide" (*Indian Journal of Ocular Pathology*, vol. 2, Dec. 1968, pp. 8–15).

Cardarelli, J. "Congenital Rubella Syndrome" (*Canadian Journal of Ophthalmology*, vol. 3, no. 3, July 1968, pp. 213–17).
Cardarelli, J., and Basu, P. K. "Lamellar Corneal Transplantation in Rabbits using Isobutyl Cyanoacrylate" (*Canadian Journal of Ophthalmology*, vol. 4, no. 2, April 1969, pp. 170–82).
Crawford, J. S. "Fascia Lata: Its Nature and Fate after Implantation and its Use in Ophthalmic Surgery" (*Transactions of the American Ophthalmological Society*, vol. 66, 1968, pp. 673–745).
Dixon, W. S., and Speakman, J. S. "Planimetric Pupillometry" (*Canadian Journal of Ophthalmology*, vol. 4, no. 2, April 1969, pp. 169–73).
Hindle, N. W., and Crawford, J. S. "Dislocation of the Lens in Marfan's Syndrome, its Effect and Treatment" (*Canadian Journal of Ophthalmology*, vol. 4, no. 2, April 1969, pp. 128–35).
Hunter, W. S. "Hemolytic Glaucoma" (*Transactions of the American Academy of Ophthalmology and Otolaryngology*, vol. 73, no. 1, Jan.–Feb. 1969, pp. 95–8).
——— "Low Vision Aids"; in *The Ophthalmic Assisstant*, by H. A. Stein and B. Slatt, pp. 271–84. St. Louis: C. V. Mosby, 1968.
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Sibay, T. M., Basu, P. K., and Rewcastle, N. B. "Experimental Production of Corneal Tumour" (*Canadian Journal of Ophthalmology*, vol. 3, no. 4, Oct. 1968, pp. 368–72).
Smith, S., and McCulloch, C. "Demodex Folliculorum Palpebrum" (*Canadian Journal of Ophthalmology*, vol. 4, no. 1, Jan. 1969, pp. 3–15).
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OTOLARYNGOLOGY

Under the direction of Professor D. P. Bryce

During the past year, members of this Department have worked with various period co-ordinators to establish the role of Otolaryngology in the new curriculum. The clinical clerks have also been assigned to the teaching hospitals and their programme of instruction formulated.

The postgraduate training programme for residents is constantly under review

and a new formula for instruction in this course has been devised. This will go into effect July 1, with the introduction into the programme of eight new candidates. Increased activity in the field of clinical and basic research is evident and in particular, the Department is pleased to have Dr. J. M. Fredrickson join us from Stanford University. This has led to the development of a research arm in the Department in the new Medical Sciences Building.

The Department has sponsored a successful course for general practitioners in Otolaryngology and an extremely well attended Conference on Vestibular Disease and Electronystagmography. This latter course attracted registrants from Canada and the United States and was of an extremely high calibre. Members of the Department attended courses and took part in conventions in Otolaryngology at most of the major centres on the continent.

Visitors to the Department included: Mr. Miles Foxen, Consultant, E.N.T. surgeon, Westminister Hospital, London, England; Mr. Douglas Ranger, Consultant, E.N.T. surgeon, Middlesex Hospital, London, England; Mr. T. Buffin, Consultant, E.N.T. surgeon, Sheffield Hospitals and Chesterfield Royal Infirmary; Dr. William McNally, Professor Emeritus, Department of Otolaryngology, McGill University, Montreal, P.Q.; Dr. Malcolm Williams, Chairman, Department of Otolaryngology, Queen's University, Kingston, Ontario; Dr. Hans Engstrom, Chairman, Department of Otolaryngology, Akademiska Sjukhuset, Uppsala, Sweden; Dr. Nils Henriksson, University of Lund, Department of Otolaryngology, Lund, Sweden; Dr. Arne Sjoberg, Department of Otolaryngology, Akademiska Sjukhuset, Uppsala, Sweden; Dr. Malcolm Stroud, Department of Otolaryngology, St. Louis, Missouri; Dr. Garth Hemenway, Chairman, Department of Otolaryngology, University of Colorado, Denver, Colorado; Dr. Paul Fugere, Chairman, Department of Otolaryngology, Laval University, Laval, P.Q.; Dr. Robert Bertrand, Department of Otolaryngology, McGill University.

The departmental weekly conferences have attracted an increasing number of guests and Faculty members and the Department is appreciative of the support it has been receiving from other University departments; the departments of Pathology, Anatomy and Physiology in particular have been extremely cooperative.

RESEARCH

The rapid expansion of research activity in all aspects of Otolaryngology has continued to such an extent that by the end of the academic year 36 projects were in varying stages of development. This progress has been made possible by the addition of staff from various parts of the world (England, Japan, United States, Czechoslovakia, and India), together with several promising recent medical graduates from Canadian universities. Furthermore, this expansion has been greatly facilitated by the allocation of more appropriate University laboratory space in the new Medical Sciences Building, the Banting Institute, and at St. Joseph's Street. Considerable financial assistance has been obtained from the Canadian Government, industry (Canadian and American), and from private sources. Although the Department does not grant graduate degrees in this specialty as yet, because of arrangements with the Department of Physiology, several graduate students are proceeding toward M.SC. and PH.D. degrees, by doing research on hearing and balance.

The various projects which have been actively pursued during the past year are as follows:

Function of the Otoliths. Experimental animal surgery on the organ of balance. Drs. W. H. Johnson and J. K. B. Smith. Supported by the Atkinson Foundation of Toronto.

Computation of Vestibular Sensitivity. Development of a special electronic computer to quantitate eye movement responses in both normals and pathologic. Dr. W. H. Johnson. Supported by the Atkinson Foundation of Toronto.

Tinnitus. A study of its aetiology. Drs. W. Johnson and D. P. Mitchell.

Directional Sensitivity of the semi-circular canals in pathologic cases. Dr. W. H. Johnson. Supported by the Atkinson Foundation.

Autonomic effects of intense vestibular stimulation. Measurement of pupil changes in humans and intra-cranial blood flow measurements. Dr. W. H. Johnson and Mr. R. Ross. Supported by the Defence Research Board of Canada.

Motion Sickness. Relative onset of symptoms. Drs. W. H. Johnson and J. A. McClure. Supported by the Defence Research Board of Canada and National Aeronautics and Space Administration (U.S.A.).

Anti-nauseant and anti-vertigo drugs. Comparison of antihistaminics, analgesics and sedatives. Drs. D. P. Bryce, J. M. Frederickson, J. A. McClure, and Roger Bradshaw. Supported by the Charlie Conacher Research Fund.

Anastomosis of micro-circulation of the larynx. Experimental animal surgery. Drs. D. P. Bryce, J. M. Fredrickson, J. A. McClure and Roger Bradshaw. Supported by Charlie Conacher Research Fund.

Histo-pathologic study of carcinoma of the larynx. Drs. D. P. Bryce, T. D. R. Briant, Wm. Anderson, F. McIntosh, J. A. McClure. Supported by Charlie Conacher Research Fund.

Tritiated Thymidine. Study of radiated serial sections of the larynx. To determine viability of tumour cells following radiotherapy. Drs. D. P. Bryce, T. D. R. Briant, J. A. McClure, Wm. Anderson, and A. G. Gornall. Supported by the Charlie Conacher Research Fund.

Epidemiological Study of carcinoma of the larynx. Drs. D. P. Bryce, Wm. Anderson. Supported by the Ontario Cancer Treatment and Research Foundation.

Cortical Audiometry. Quantative assessment of hearing ability using a computer analysis of electro-encephalogram during and after exposure to sound. Improvement of technique and application to newborn infants, mentally retarded children, industrial deafness, etc. Drs. D. P. Bryce, W. S. Goodman, K. Taguchi, and T. W. Picton. Supported by the Carey Fox Foundation and the Workmen's Compensation Board of Ontario.

Nasal Air Flow. Development of methods for quantitative measurement of nasal patency, applicable for evaluation of effectiveness of nasal decongestants and surgical techniques.

Temporal Bone Histopathology. By the establishment of a modern histology laboratory in co-operation with the Department of Pathology, a Temporal Bone "Bank" is being developed to assist research and graduate study in Otolaryngology. Drs. D. P. Bryce, J. Farkashidy, J. M. Fredrickson, and M. Hawke. Supported by Toronto General Hospital and Department of Health, Ontario Government.

Electron-microscopic studies of the auditory and non-auditory labyrinth. Two projects involving normal cellular physiology but with clinical application; namely, (*a*) Origin and circulation of endolymph and (*b*) Regenerative capacity of sensory receptors. G. Dohlman. Supported by the Defence Research Board and the Medical Research Council.

Significance of Vertical Nystagmus. A study of its pathologic significance. Drs. D. P. Bryce and J. Farkashidy. Supported by the Hartford Foundation of New York.

Spontaneous nystagmus. A study of its occurrence in the normal population and in pathologic cases. Dr. D. P. Bryce, Dr. H. O. Barber, and Dr. D. Smith. Supported by the Hartford Foundation of New York.

Calorically induced nystagmus in the normal population. A study of the variations among normals (race, sex, etc.). Drs. H. O. Barber and D. M. Smith. Supported by the Medical Research Council.

Vestibular effects of neck injury. A study of the role of the cervical afferents on equilibrium. Drs. J. A. McClure, H. O. Barber, and W. H. Johnson. Supported by the Medical Research Council.

Central vestibular representation. A study of the cerebral cortex in relation to balance and hearing. Dr. J. M. Fredrickson. Supported by the Medical Research Council.

Efferent nerve supply to the cochlea. A study of the role of the olivo-cochlear bundle in hearing. Dr. V. S. Dayal, Deafness Research Foundation of New York.

Block dissection of the neck. The development of surgical procedures for extensive removal of neck carcinoma. Drs. D. P. Bryce and V. S. Dayal. Supported by Sunnybrook Hospital Staff Fund.

Rheumatoid arthritis and hearing. A study of sound conduction by the tympanum and ear ossicles in arthritis and old age. Dr. P. Alberti. Supported by Sunnybrook Hospital, research fund.

Visual aids for the teaching of otolaryngology. An evaluation of appropriate procedures specific to otolaryngology. Dr. P. Alberti. Supported by Sunnybrook Hospital.

Epidemiological study of ear diseases in the Canadian Eskimo. Dr. J. M. Fredrickson.

Electrical activity of the labyrinth. A study of the D.C. potential resting activity of the vestibular branch of the eighth cranial nerve. Dr. V. S. Dayal. Supported by Sunnybrook Hospital.

Opto-kinetic nystagmus. Studies on the after-effects of its induction and vestibular facillation. Dr. V. S. Dayal and Dr. Y. Morissette.

Hearing loss patterns. Dr. V. S. Dayal and Dr. P. Alberti. Supported by Sunnybrook Hospital.

Auditory and non-auditory defects in children. Studies on characteristics of the temporal bone aided by radiography. Dr. V. S. Dayal and G. Wortzman.

Pathology of presbycusis. Audiologic and histo-pathologic studies of old age. Dr. V. S. Dayal, Dr. J. Farkashidy, and Dr. Wm. Anderson.

Directional preponderance of vestibular response. Study of its significance in calorically induced nystagmus. Drs. Y. Morissette and G. Wright. Supported by Sunnybrook Hospital.

Teaching film on Dizziness. A description of diagnostic procedures. Dr. H. O. Barber.

Hearing aid implantation. Insertion of micro-amplifier in the middle ear. A study of its feasibility. Dr. J. M. Fredrickson.

Inter-relationship of optokinetic, rotational and calorically induced nystagmus in normal and pathologic subjects. Dr. H. O. Barber. Supported by Sunnybrook Hospital.

Two teaching films on Pathological Eye Movements: (*a*) Peripheral Vestibular Syndromes; (*b*) Central vestibular and oculomotor syndromes. Dr. J. M. Fredrickson.

Teaching film on reconstructive head and neck surgery. Dr. J. M. Fredrickson.

HONOURS

R. D. Bell, Fellow, American College of Surgeons, October, 1968.

T. D. R. Briant, film entitled "Transphenoidal Hypophysectomy" won the award in its class at the Canadian Medical Association Contest; Doctor Ignatio of Barraquier Award, won in Chicago for Cinematography in Medicine.

Morgan Brosnan, Fellow, American College of Surgeons, October, 1968.

J. S. Chapnik, Fellow, American Academy of Ophthalmology and Otolaryngology.

G. Dohlman, Barany Medal at Uppsala Sweden for distinguished research contributions on the cellular physiology of the organ of balance.

J. M. Fredrickson, Fellow, American College of Surgeons, October, 1968; elected member of the Barany Society, 1968.

Joseph Gollom, elected Board of Directors, American Society of Facial Plastic and Reconstructive Surgery, 1968–69.

W. H. Johnson, elected Chairman, Panel on Auditory and Vestibular Problems, Defence Research Board of Canada.

D. P. MITCHELL, Director, Canadian Hearing Society.
ARNOLD NOYEK, elected secretary, E.N.T. section, Academy of Medicine.

SCHOLARLY ADDRESSES

P. W. R. M. ALBERTI, "Use of Audiovisual Aids in Teaching Otolaryngology," New Orleans, American Triological Society, March 25, 1969; "Epithelial Migration of the Tympanic Membrane," Toronto, Academy of Medicine, September, 1968.

R. D. BELL, "Symposium on Noise in Industry," Mine Safety Association Convention, May, 1969.

T. D. R. BRIANT, "Angiofibroma," Ontario Medical Society, Section of Otolaryngology, May, 1969; "Fascia Grafts in Head and Neck Surgery," American Academy of Facial, Plastic and Reconstructive Surgery, Chicago, 1969; "Transphenoidal Hypophysectomy," Academy of Otology, Pittsburgh, Ohio, April, 1969.

M. L. BROSNAN, "Tympanoplasty," Academy of Medicine, Toronto, October, 1968.

D. P. BRYCE, "Malignant Granuloma. A Diagnostic Problem," American Laryngological Association, Columbus, Ohio, January, 1969; "Management of Laryngeal Chondroma," American Society of Head and Neck Surgery, New Orleans, March, 1969; "Some Problems of Assisted Respiration," Connecticut State Medical Meeting, Hartford, Connecticut, April, 1969; "Traumatic Laryngotracheal Injury," Detroit, Ear, Nose and Throat Society, Detroit, December, 1968; "Tracheotomy: Indications and Complications," 32nd Annual Meeting of the New Orleans Graduate Medical Assembly, New Orleans, March 12, 1969; "Traumatic Laryngotracheal Injury," 32nd Annual Meeting of the New Orleans Graduate Medical Assembly.

V. S. DAYAL, "Laryngectomy and Radical Neck Dissection," Canadian Otolaryngological Society, Winnipeg, Manitoba, June, 1969; "Pattern of Sensorineural Hearing Loss," Canadian Otolaryngological Society, Winnipeg, Manitoba, June, 1969.

J. M. FREDRICKSON, "Reconstruction of Cervical Esophagus Using Jejumum," American Academy of Facial Plastic and Reconstructive Surgery, Hollywood Beach, Florida, April, 1969; "Nystagmus—Localization Value in Diagnosis," Conference on Vestibular Disease and Electronystagmography, Department of Otolaryngology, University of Toronto, March, 1969; "Multisensory Influence upon Single Units in the Vestibular Nucleus," National Aeronautical Space Administration, Pensacola, Florida, September, 1968; "Problems Concerning Microvascular Anastomosis in Transplantation Surgery," Canadian Otolaryngological Society, Winnipeg, Manitoba, June, 1969.

D. A. HALDENBY, "Management of Oro-cutaneous Fistulae," Ontario Medical Association, annual meeting, Toronto, June, 1969; "Management of Inflammatory Disease," Postgraduate Course in Otolaryngology for General Practitioners.

W. H. JOHNSON, "Medical Problems Concerned with Space Travel," Annual Postgraduate meeting of General Surgeons; "Secondary Factors Affecting Motion Sickness Susceptibility," United States Naval Aerospace Institute, National Aeronautics and Space Administration, Pensacola, Florida; "Orientation in Space," Senior Executive of Air Canada, Montreal, March, 1969; "Detection of Cold Sweat as an Indicator of the Onset of Motion Sickness," University of Chicago, Committee for Research in Otolaryngology, American Academy of Ophthalmology and Otolaryngology, October, 1968.

M. D. MORRISON, "Clinical Measurement of Nasal Airflow Capacity," University of Chicago, Committee for Research in Otolaryngology, American Academy of Ophthalmology and Otolaryngology, October, 1968.

ARNOLD NOYEK, "Cysts, Benign Tumours and Bone Dysplasia involving the Paranasal Sinuses," American Society for Head and Neck Surgery, New Orleans, March, 1969.

G. P. Rosen, "Nasal Haemorrhage—Its Management," St. Joseph's Hospital, Toronto, Department of General Practice.

G. E. D. Snell, "Observations on Beethoven's Deafness," Academy of Medicine, Section of Otolaryngology.

Page Statten, "Communication Among the Deaf: Aspects of Older and Newer Methods," Department of Psychiatry, University of Toronto; "Recent Advances in the Diagnosis and Management of Deaf Children," Kitchener, Ontario, October 24, 1968.

J. A. Sullivan, "Edmund Prince Fowler Lectureship," American Otological Society, New Orleans, La., March, 1969.

PUBLICATIONS

Alberti, P. W. R. M., and Dawes, J. D. K. "Undergraduate Training in Otolaryngology in the University of Newcastle-upon-Tyne" (*Journal of Laryngology and Otology*, Aug. 1968, pp. 723–30).

Alberti, P. W. R. M., and Munro Black, J. I. "Iatrogenic Symptoms in Otolaryngology" (*Journal of Laryngology and Otology*, vol. 82, no. 8, Aug. 1968, pp. 731–7).

Barber, H. O. "Head Injury. Audiological and Vestibular Findings" (*Annals of Otology, Rhinology and Laryngology*, vol. 78, no. 2, April 1969, pp. 239–52).

Barber, H. O., Joy, N., Blackstock, E., and Elliot, K. *Dizziness* (film). University of Toronto, May 1969.

——— "Vestibular Tonus" (excerpt from film *Dizziness*, March 1969).

Bell, R. D. *et al.* "Neuroleptanalgesia for Stapes Surgery" (*Archives of Otolaryngology*, vol. 88, Nov. 1968, pp. 491–4).

Bradshaw, R. B. "Perphenazine Dystonia presenting as Recurrent Dislocation of the Jaw" (*Journal of Laryngology and Otology*, vol. 83, no. 1, Jan. 1969, pp. 79–82).

Bryce, D. P. "Tracheotomy: Indications and Complications" (*Journal of the Louisiana State Medical Society*, vol. 121, no. 4, April 1969, pp. 111–21).

Bryce, D. P., Briant, T. D. R., and Pearson, F. G. "Laryngeal and Tracheal Complications of Intubation" (*Annals of Otology, Rhinology and Laryngology*, vol. 77, no. 3, June 1968, p. 442).

Chapnik, J. S., and Snell, D. "Glomus Tumours of the Temporal Bone" (*Canadian Medical Association Journal*, vol. 99, no. 4, July 27, 1968, pp. 157–63).

Dayal, V. S. "The Effects of the Olivocochlear Bundle Stimulation on Latency of Action Potential" (*Laryngoscope*, vol. 78, Sept. 1968, p. 1590).

——— Review, *Applied Therapeutics*, Nov. 1968, p. 780.

Dohlman, G. "Shape and Function of the Cupula" (*Journal of Laryngology and Otology*, vol. 83, no. 1, Jan. 1969, pp. 43–53).

Dohlman, G., and Radomski, M. W. "The Ion Selective Function of the Epithelium of the Membranous Canal Walls" (*Acta Oto-laryngologica*, vol. 66, 1968, pp. 409–16).

Fee, G. A. "Traumatic Perilymphatic Fistulae" (*Archives of Otolaryngology*, vol. 88, Nov. 1968, pp. 477–80).

Fredrickson, J. M., and Strahan, R. "Technique of Microvascular Suture Anastomosis: Application to Otolaryngology" (*Archives of Otolaryngology*, vol. 89, April 1967, pp. 569–73).

Fredrickson, J. M. *et al.* "Nystagmus: Diagnostic Significance of Recent Observations" (*Archives of Otolaryngology*, vol. 89, March 1969, pp. 504–11).

Gollom, J. "Perforation of the Nasal Septum. The Reverse Flap Technique" (*Archives of Otolaryngology*, vol. 88, Nov. 1968, pp. 518–22).

Goodman, W. S. "Use of Cancellous Autogenous in Rhinoplasty" (*Proceedings, Canadian Otolaryngological Society*, vol. 22, 1968, pp. 119–24).

Johnson, W. H. "Secondary Factors in the Aetiology of Motion Sickness"; in *Fifth Symposium on vestibular problems in the exploration of space*. National Aeronautic and Space Administration, Sept. 1968.

Johnson, W. H. *et al. A Sensitive Sweat Detector.* Institute of Biomedical Electronics, University of Toronto. Sept. 1968.

Morissette, Y. *et al.* "Deux ans de reconstruction ossiculaire" (*Union Médicale du Canada*, vol. 98, no. 1, jan. 1969, pp. 63–9).

Noyek, A. "Tumours and other Ossious Disorders of the Temporal Bone" (*Seminars in Röentgenology*, vol. 4, no. 2, April 1969, p. 151).

Pearson, B. W., Mackenzie, R. G., and Goodman, W. S. "The Anatomical Basis of Transantal Ligation of the Maxillary Artery in Severe Epistaxis" (*Laryngoscope*, vol. 79, May 1969, pp. 969–84).

Wagner, G. A. "Schwannoma of the Nasal Fossa" (*Proceedings of the Canadian Otolaryngological Society*, vol. 22, 1969, pp. 145–57).

PAEDIATRICS

Under the direction of Professor H. W. Bain

The Department of Paediatrics of the University of Toronto and the Hospital for Sick Children in collaboration with the other departments of the Faculty of Medicine initiated a programme of delivery of health care in the Sioux Lookout region of northwestern Ontario. This programme is supported by the federal government.

The project, Teaching Assistance to the University of the West Indies in Jamaica, continued, but this is probably our final year there.

Dr. P. D. McClure succeeded Dr. John Darte as Chief of the Division of Haematology in the Hospital for Sick Children. Dr. R. Sephton Smith joined the full-time staff of the Division of Haematology.

Dr. C. Collins-Williams became the full-time Head of the Division of Allergy and Dr. J. A. Turner the full-time Head of the Division of Chest Diseases.

Dr. John Steele joined the full-time staff of the Division of Neurology, as did Dr. F. Coceani, who will head up research in Neurophysiology.

Dr. T. Izukawa and Dr. Peter Olley joined the full-time staff of the Division of Cardiology. Dr. T. Baliah joined the full-time staff of the Division of Nephrology.

Dr. Robert Goode joined the Division of Respiratory Physiology as an Exercise Physiologist.

Dr. Pamela Grayson joined the part-time staff of the Division of O.P.D.

Other staff appointments were Dr. Gordon Donsky to the Division of Allergy, Dr. Kathleen Fullerton to the Division of General Paediatrics.

Dr. George Collins left the full-time staff of the Division of Cardiology to take up a similar position at the Montreal Children's Hospital.

Dr. Donald Fraser returned from a one-year's study leave in Switzerland to continue his work in the Division of Metabolic Research.

Child Psychiatry became a new department within the Hospital for Sick Children with Dr. Quentin Rae-Grant as its Head.

Dr. J. S. Prichard spent six weeks in Bangkok, Thailand, assisting in the development of a Department of Neurology.

The Department was saddened by the death of Mr. Grant Glassco, former Chairman of the Board of Trustees of the Hospital for Sick Children and Dr. Helen McKinley, who served for many years in the Department of Paediatrics.

Professor Zvi Laron of Israel, Dr. Ruth Illig of Zurich, Switzerland, Professor Goran Sterky of Stockholm, Sweden, and Dr. William Silverman of San Francisco, California, spent several days in the Department as Visiting Professors.

The following visited the Department of Paediatrics during 1968–69: Dr. Kurt Hirschhorn, Mt. Sinai School of Medicine, New York City; Prof. J. S. Saksena. Dept. of Physiology, Medical College, Hubli, India; Dr. Luis G. Ibarra, Hospital Infantil de Mexico, Mexico; Dr. William A. Silverman, Children's Hospital, San Francisco, California; Dr. J. Collee, University of Edinburgh Medical School; Prof. Bozzoli, South Africa; Dr. James Teele, Harvard School of Public Health, Boston, Mass.; Dr. Peter Adams, Case Western Reserve University, Cleveland, Ohio; Prof. Goran Sterky, Karolinska Institute, Stockholm, Sweden; Dr. P. R. Knight, University of Adelaide, Australia; Prof. Zvi Laron, Petah Tiqva, Israel; Dr. F. Versar, University of Basel, Switzerland; Dr. Ruth Illig, Children's Hospital, Zurich, Switzerland; Dr. B. Neal, Royal Children's Hospital, Melbourne, Australia; Dr. R. McDonald, University of Cape Town, South Africa; Prof. R. G. Hendrickse, University of Ibadan, Nigeria; Dr. Bruce Chown, University of Manitoba, Winnipeg; Prof. B. L. Perey, University of Sherbrooke, Quebec; Dr. J. E. Siegmiller, Bethesda, Maryland; Dr. Barbara Clayton, Hospital for Sick Children, London, England; Dr. John F. McCreary, University of British Columbia, Vancouver; Dr. M. K. Strolling, Plymouth, England; Dr. I. Scheinberg, Albert Einstein College of Medicine, New York City; Dr. Robin Bannerman, Buffalo, New York; Dr. J. M. Berg, London, England;

Dr. R. J. Haggerty, University of Rochester, New York; Prof. A. Royer, Montreal, Quebec; Prof. W. B. Castle, Boston, Mass.; Dr. W. J. Weston, Wellington, New Zealand; Prof. Charles A. Janeway, Boston, Mass.; Dr. L. E. G. Sloan, Royal Children's Hospital, Victoria, Australia; Dr. W. W. Payne, Hammersmith Hospital, London, England; Dr. D. G. Vulliamy, Dorchester, England.

RESEARCH

Adolescent Clinic

The Adolescent Clinic under the direction of Dr. Martin Wolfish continued to flourish. The age limit for admission to the Hospital for Sick Children was increased to 19 years so that adolescents could be admitted. In addition to Service and Teaching, clinical investigation proceeded in the following areas: (1) group therapy for adolescent obesity; (2) plasma insulin growth hormone and fatty acid studies in obese adolescents; (3) dysmenorrhea in adolescents.

Allergy

Under the direction of Dr. C. Collins-Williams, investigation continued in the following: (*a*) provocative bronchial testing as an aid in the elucidation of the etiology of intractable asthma; (*b*) the importance of mold allergy in the etiology of perennial allergic rhinitis; (*c*) IgA in secretions of the respiratory tract of children; (*d*) disodium cromoglycate (Intal) in the treatment of asthma; (*e*) a computer analysis of asthma in children. In addition, three Fellows are being trained in Paediatric Allergy.

Cardiology

Under the direction of Dr. John Keith, various projects have been initiated or continued. Doctors Keith, Fowler, Kidd, Collins, Rose, Li, and Olley have studied the natural history of various congenital heart defects, with special reference to transposition of the great vessels, pulmonary vascular disease, atrial septal defect, and ventricular septal defect. The latter has been found to close spontaneously in a surprisingly large proportion of children, possibly as high as 20 per cent. Dr. George Collins has developed fully the Rashkind method of doing balloon septostomies. Computer techniques have been applied to recording and analysing specific aspects of congenital heart defects, both clinical, haemodynamic and surgical.

Doctors Kidd, Fukuda and Olley have assessed the effects of beta adrenergic blockade on the pulmonary and systemic circulation in anaesthetised dogs and the variations produced by oxygen lack.

The haemodynamic effects of the Sterling Edwards operation were evaluated by Dr. Kidd and Dr. Trusler. Dr. Virmani and Dr. Kidd studied intracardiac shunts with various degrees by means of the fiberoptic catheter, which reflects the degree of oxygen saturation of the blood passing through the heart or through various defects.

Dr. Fowler and Mr. Henry O'Beirne have applied computer techniques in recording and analyzing electrocardiograms and vectorcardiograms.

Chest

Under the direction of Dr. J. A. Turner, the Chest Division began assembling computer data on their clinical material. Dr. V. V. Sreenivasan completed a study on Hyperlucent Lung in Childhood. A study of the role of Mycoplasma Pneumoniae in Respiratory Diseases of children was completed and published. In the Respiratory Physiology Laboratory under the direction of Dr. Henry Levison, the following studies are being conducted:

Asthma—Serial studies of lung volume and mechanics of ventilation in patients with bronchial asthma (in collaboration with the Allergy Division);

Cystic Fibrosis—The study of regional ventilation and regional perfusion, lung volume and mechanics of ventilation in an attempt to measure objectively the results

of therapy (in collaboration with Dr. Douglas Crozier, Head of the Cystic Fibrosis Sub-division).

Scoliosis—In collaboration with Dr. John Hall of the Orthopaedic Service, a study of pre- and post-operative changes in the lungs of children with scoliosis has been carried out. Over 200 patients have been studied in the past 1½ years;

Radioactive Studies—In collaboration with Dr. Norman Aspin, studies of regional perfusion and ventilation with Xenon have been conducted to serve as controls for studies of regional ventilation in asthma, cystic fibrosis, and scoliosis;

R. C. Goode, Ph.D. (Oxon), whose primary appointment is with the Toronto Board of Education, joined the group on a part-time basis as Exercise Physiologist and is studying exercise tolerance and nutritional status in two groups of high school students with different socio-economic backgrounds. An attempt will be made to correlate their academic achievement with the measured parameters.

Dr. Douglas Crozier, Head of the Cystic Fibrosis Sub-division is studying the natural history of cystic fibrosis and the results of various therapeutic regimens.

Endocrinology

Dr. J. D. Bailey and his group conducted the following studies:

Studies on Growth and Growth Failure (in collaboration with Dr. Julio Martin). These include growth hormone in relation to children who have had a low birth weight for gestational age and low birth weight due to prematurity; also children with hypopituitary dwarfism. In collaboration with Dr. Patrick Conen of the Pathology research division, studies of the mucopolysaccharidoses by means of tissue culture and histochemical techniques are being carried out. A special clinic for the study of normal and abnormal growth is being established within the Outpatient Clinic.

Under the direction of Dr. Ehrlich in collaboration with Dr. Julio Martin, the following are being investigated: (i) Effect of Drugs on Hypoglycemia; (ii) Mechanism of Ketotic Hypoglycemia; (iii) Chlorpropamide in the Treatment of Diabetes Insipidus; (iv) A Review of patients with Diabetes Mellitus of ten years duration; (v) A prospective study on all children who develop Diabetes.

Gastroenterology

Under the direction of Dr. J. R. Hamilton, with the collaboration of Dr. A. Sass-Kortsak and Dr. J. Weber, this Division continued to provide consultation service for patients with disorders of the gastrointestinal system. A new multi-discipline clinic was established for the assessment and care of children with colitis.

The teaching activities of the staff include heavy involvement with both undergraduate and postgraduate programmes. Programmes for the training of paediatric gastroenterologists were expanded in order to accommodate two Fellows under Dr. Hamilton's supervision and one under Dr. Sass-Kortsak. The major emphasis, however, continued to be on the research activities of the Division. A list of the programmes follows:

Dr. Hamilton's research is centred on the study of mechanisms of intestinal malabsorption using the rat as an experimental model. Investigations of acute diarrheal states have been expanded with the following projects: (i) An assessment of electrolyte balance in response to cholestyramine in young infants with intractable diarrhea; (ii) Effect of under-nutrition and dehydration on intestinal mucosal enzyme activity in rats and in children; (iii) Development of an assay system for intestinal mucosal sodium and potassium dependent ATPase.

Dr. A. Sass-Kortsak and his group are primarily interested in liver disease in children and have several projects, including copper metabolism in general and Wilson's disease in particular. Dr. Aspin is studying the rates of equilibration of copper between various body-compartments of rats. Dr. B. Sarkar is investigating the interactions between cupric ions and amino acids, polypeptides, proteins, and other organic compounds, with the ultimate aim of better understanding the biologi-

cal transport of copper. Mrs. Diane Wilson-Cox, geneticist, is investigating the heterogeneity of ceruloplasmin and is conducting family studies of Wilson's disease. Dr. Sass-Kortsak and Mrs. Ruth Clark are investigating the factors influencing copper transport at the cellular level. Dr. Patrick Wei is studying the handling of copper by patients with acute and chronic liver disease other than Wilson's disease. Dr. Sass-Kortsak and Dr. S. H. Jackson completed a detailed investigation of the handling of amino acids of patients with chronic liver disease. Dr. J. Weber, of the Clinical Paediatric staff, in collaboration with Dr. Sass-Kortsak is collecting data on the natural history of various types of liver disease in children.

Genetics

Under the direction of Dr. Margaret Thompson, this division continues investigation into the genetic diseases of childhood, especially Duchenne Muscular Dystrophy, congenital Adrenal Hyperplasia and Galactosemia. Discriminant analysis of the dermatoglyphics of a large series of controls and children with mongolism is in progress, to attempt improved recognition of mongolism at birth.

Haematology

Under the direction of Dr. P. D. McClure, the Division of Haematology has continued to operate in the areas of laboratory service, patient care, teaching and research. The division has continued to work in the following research projects: (1) co-operative group A chemotherapy trials in childhood leukemia and malignancies. New drugs introduced in 1968–69 were L-asparaginase and Dibromodulcitol. All members of the division co-operated; (2) white cell kinetic studies in leukemia—Dr. Fred Saunders; (3) glycolytic enzyme changes in leukemia cells—Dr. Pryma Skowron; (4) Hemostatic functions in premature infants and infants with respiratory distress syndrome—Dr. P. D. McClure and Dr. S. Mistry; (5) Electrolyte flux and ATPase studies in stomatocytosis—Dr. P. D. McClure and Dr. Robert Sutton.

Infection Service

Under the direction of Dr. Crawford Anglin, this division has an extremely heavy service and teaching commitment and has continued its clinical investigation in the following areas: (1) continuation of the study on purulent meningitis—a study has been completed on 250 cases of purulent meningitis with special reference to treatment, specific and supportive. During this study, the mortality rate in purulent meningitis has fallen to a new all-time low of 3.4 per cent; (2) management of fulminating meningococcal sepsis; (3) varicella encephalitis; (4) measles encephalitis; (5) neonatal meningitis and sepsis—a comprehensive study to determine the most effective antimicrobial and supportive therapy in these highly fatal infections has just commenced; (6) gastroenteritis—an epidemiological study of gastroenteritis during the summer, including a bacteriological and virological survey of household contacts has commenced, as has a study of the relative merits of various antimicrobial agents in the treatment of specific types of gastroenteritis.

Medical Publications

Under the direction of Dr. Helen Reid, this division has processed scientific papers at the rate of 15 per month and has assisted with the preparation of manuscripts for three books.

Help was given with oral presentations, television and movie scripts, and methods of improving medical records were tested.

A two-and-one-half day course in Scientific Writing for 36 experienced authors on the staff of the Hospital for Sick Children was given in March by a faculty including Dr. Charles Roland, Senior Editor of the *Journal of the American Medical Association*, Mr. Borden Spears, Editor of *Maclean's Magazine*, and Dr. John Godden of the University of Toronto, Department of Continuing Medical Education.

Neurology
Under the direction of Dr. J. S. Prichard and Dr. J. A. Lowden (Research), studies included the following: (i) anticonvulsant drug studies on epileptics (Dr. Prichard); (ii) a multi-disciplinary assessment of children with learning disabilities, carried out with the active collaboration of Dr. A. Rebhan; (iii) Dr. Lowden is primarily engaged in a study of brain lipids; (iv) Dr. Flavio Coceani, neurophysiologist, is studying the functional significance of prostaglandins in brain; (v) Dr. E. G. Murphy, in collaboration with Dr. Margaret Thompson and Dr. P. Conen, is studying hereditary muscular dystrophies and electron-microscopic features of muscle disease.

Metabolic
Under the direction of Dr. Donald Fraser and with the collaboration of Dr. I. M. Radde, Dr. Sass-Kortsak, Dr. Margaret Thompson (genetics), Dr. Hercz (biochemistry), and Dr. W. Hanley (clinical paediatric staff), the following studies are under way: (1) radio-immunoassay and immunological studies of parathyroid hormone; (2) magnesium metabolism in experimental animals; (3) clinical investigations in metabolic bone disease in children, refractoriness to parathyroid hormone in vitamin D deficiency, hypoparathyroidism, pseudohypoparathyroidism, and osteopetrosis; (4) studies in thyro-calcitonin; (5) methods of measuring ionized calcium levels in plasma or serum; (6) temporary hypocalcemia and hypomagnesemia in the neonatal period; (7) the effect of prolonged magnesium depletion on calcium and magnesium kinetics; (8) the effect of hypermagnesemia on release of calcitonin; (9) methods for the measurement of red blood cell and other tissue ATPases are being developed and normal values will be established; (10) a method has been developed for measurement of ammonia in urine and stool for collaborative studies with Dr. R. J. Hamilton of the Gastroenterology Division.

Dr. Sass-Kortsak, in collaboration with Dr. S. H. Jackson of the Biochemistry Research Division and Dr. M. Thompson (Genetics), is investigating mechanisms, including clinical, biochemical, and genetic aspects of inborn errors of amino acid metabolism, such as tyrosinemia, hyperglycinemia, homocystinuria, cystathioninuria, and cystinuria. Dr. W. B. Hanley is conducting clinical research in phenylketonuria. Studies aimed at carrier detection and incidence of heterozygosity in families with galactosemia are progressing.

Neonatology
Under the direction of Dr. P. R. Swyer and with the collaboration of Dr. Robert Farber, Dr. W. B. Hanley, Dr. D. Hoare, Dr. M. Kosoy, and Dr. L. Linsao, Dr. N. Aspin and several other divisions, many projects are underway. This area has an extremely heavy service and teaching responsibility as well. Research activities include the following: (i) mechanical artificial ventilation; (ii) pathophysiological investigations in respiratory distress syndrome; (iii) intra-uterine fetal surgery (in conjunction with Dr. John Burrington of the Department of Surgery).

Dr. Robert Farber took over the headship of the Newborn Nurseries at the Toronto General Hospital during the year and has been actively engaged in reviewing nursery practices and nursing education. Dr. Farber is also involved with Dr. Robert Ehrlich in a study of hypoglycemia in infants with erythroblastosis fetalis. The resident staff was involved in five clinical projects during the year. Other activities include the following: (a) prognostic scoring in the respiratory distress syndrome using a linear discriminant analysis; (b) twelve-month survey of intensive care unit experience; (c) the development of a method for the measurement of regional ventilation and blood flow in the lungs of rhesus monkeys.

Nephrology
Under the direction of Dr. C. Phillips Rance and with the assistance of Dr. T. Baliah, staff physician in charge of dialysis, and Dr. S. W. Kooh, recently transferred from

the Metabolic Division and Dr. Trevor Hunt, the following projects were carried out: (i) light and electron microscopic study of renal biopsies; (ii) the role of immunosuppressive agents in treatment of children with nephrotic syndrome and other glomerular diseases; (iii) intermittent dialysis in management of chronic renal failure in children pending transplantation; (iv) low protein diet in management of chronic renal failure; (v) long-term prognosis of nephrotic syndrome.

The chronic dialysis-transplantation programme is well under way and approximately 30 patients in various stages of chronic renal failure are being followed on an out-patient and an in-patient basis. Eight patients are on chronic dialysis and four have had renal transplantation using cadaver transplants. All are functioning well to date.

Dr. Trevor Hunt has followed patients with nephrotic syndrome who have become refractory to steroid treatment and have been treated with cyclophosphamide. A total of 71 renal biopsies were carried out during the year for patients with diagnostic problems and for the nephrotic children who had become dependent on or resistant to therapy with steroid and before commencing treatment with cyclophosphamide.

Out-Patients (Ambulatory Services)

The Division of Ambulatory Services has continued to grow at a steady pace with an increase of 10 per cent in patients seen over the previous year.

One of the recent successful innovations is the formation of an Acute Treatment Clinic (Screening Clinic) from 8 A.M. until 11 P.M. daily, including weekends. This is staffed by a Staff Physician on a rotation basis, residents and Fellows. In addition to providing a valuable community service, it has proved to be an excellent teaching resource for students and residents alike.

Another new innovation is the Ambulatory Psychiatric Clinic under the direction of Dr. S. Levine, who is a member of the Hospital's Department of Child Psychiatry. This clinic functions three days per week in the general medical OPD and provides a rapid and successful consultative psychiatric service. It has proved very valuable for teaching, and students and house staff are being encouraged to look after the behaviour problems and minor psychiatric problems seen in an ambulatory setting.

Research projects include: study of the prevalence of haemolytic streptococcus as the cause of pharyngitis and tonsillitis in an out-patient population; the efficacy of treatment with antibiotics coupled with an assessment of the reliability of parents to administer such preparations; the incidence of complications in these patients (Dr. Donald Stewart).

Dr. J. B. McKendry is assessing the natural history of enuresis in children and the efficacy of various forms of treatment.

HONOURS

B. S. L. KIDD, Fellow of the American College of Cardiology, 1969.

J. A. P. TURNER, Member of Council, American Thoracic Society.

M. G. WOLFISH, Chairman of the Committee for Outpatients, Society on Adolescent Medicine.

SCHOLARLY ADDRESSES

H. W. BAIN, "Diarrhea in Children," "The Low Birth Weight Infant," "Growth Failure in Children," "Antibiotics in Paediatrics," "Jaundice in Infancy and Children," Lakehead Summer School, Port Arthur, Ontario.

——— "Ambiguous Genitalia and Intersex," "Growth Failure," Visiting Professor, Queen's University, Kingston, Ontario.

T. BALIAH, "Renal Diseases in Children," Altoona Hospital, Altoona, Pa.

——— "Hyper Proteinemia Proteinuria in Coagulation Disorders," American Society for Pediatric Research, Atlantic City, N.J.
——— "Haemodialysis in Children," Ontario Dialysis Association Convention.

C. Collins-Williams, "Treatment of the Acute Asthmatic Attack in Children, with Emphasis on the Intensive Care Unit," Staff, Dept. of Paediatrics and House Staff, Sophia Children's Hospital & Neonatal Unit, Rotterdam, The Netherlands.
——— "The Use of Isoproterenol in the Treatment of the Acute Asthmatic Attack with Report of a Case," 2nd International Congress of Paediatric Allergy, Mexico City.
——— "Status Asthmaticus" (member of panel), 2nd International Congress of Paediatric Allergy, Mexico City.

J. R. Hamilton, "Infusion of Lactic Acid into the Intestinal Lumen. An Experimental Model of Gluten Intolerance," 8th International Congress of Gastroenterology, Prague, Czechoslovakia.
——— "Restriction of Dietary Carbohydrate in Rats with 'Blind Loop' Steatorrhea," Canadian Society for Clinical Investigation, Vancouver, B.C.
——— "The Pathogenesis of Celiac Diseases," Children's Hospital, Zurich, Switzerland.

T. M. Hunt, "Cyclophosphamide in the Treatment of Nephrotic Syndrome," Alumni Association of The Hospital for Sick Children, 20th Annual Reunion, Toronto.

J. D. Keith, Asian Pacific Conference in Cardiology, Tel Aviv, Israel.
——— European Congress in Cardiology, Athens, Greece.
——— Canadian Heart Foundation & Canadian Cardiovascular Society.
——— "Prognosis in Certain Congenital Heart Defects," Cardiology Course, The Hospital for Sick Children, Toronto.
——— "Recent Advances in Congenital Heart Disease," Government Medical Officers Meeting, Kingston, Jamaica.
——— "Prognosis in Congenital Heart Disease," Albany, New York.
——— "Rheumatic Fever." "Treatment of Congenital Heart Disease," St. Francis Hospital, Hartford, Connecticut.
——— "Treatment of Transposition of the Great Vessels," American College of Cardiology and The Montreal Heart Institute, Montreal, Quebec.

B. S. L. Kidd, "Ventricular Septal Defect in Childhood," Ontario Medical Association, Timmins, Ontario.
——— "Right Venticular Outflow Tract Reactivity," Canadian Society for Clinical Investigation, Vancouver, B.C.
——— "Coronary Arteriovenous Fistulae," Royal College of Physicians of Canada, Vancouver, B.C.
——— "Hypoxic Pulmonary Vasoconstriction in Anaesthetized Dogs with and without Controlled Ventilation," Canadian Federation of Biological Societies, Edmonton, Alberta.
——— "Heart Disease in Infancy," Cardiology Course, The Hospital for Sick Children, Toronto.

P. D. McClure, "Bleeding in Massive Transfusion, Exchange Transfusion and Extra Corporeal Circulation," Alumni Association of The Hospital for Sick Children, 20th Annual Reunion, Toronto.
——— "Diffuse Intravascular Clotting in Children," Canadian Medical Association Meeting, Toronto.

J. S. Pritchard "The Neurological Implications of Prostaglandin Research," Toronto Neurological Society.
——— "Neurophysiology and Cerebral Palsy," Medical Directors of Rehabilitation Centres of Ontario.

M. J. Sonley, "Acute Leukemia in Childhood," Staff, Joseph Brant Memorial Hospital.
——— "The Current Status of Chemotherapy of Leukemia," Alumni Association of The Hospital for Sick Children, 20th Annual Reunion, Toronto.

P. R. Swyer, "Artificial Ventilation in the Newborn," 4th World Congress of Anaesthesiologists, London, England.
——— "Research and Clinical Management of Respiratory Distress of the Newborn," Conference on Respiratory Therapy, Boston, Mass.
——— "Intensive Care of the Newborn," 1969 Aspen Conference on the Newborn, Aspen, Colorado.
——— "The Newborn and his Environment: Thermoregulation and Energy Metabolism. The Newborn's Response to Changes in his Physical Environment," McGill University, Montreal, Quebec.
——— "Symposium on Artificial Ventilation in the Newborn," Co-Chairmen: Doctors A. Minkowski, P. Swyer, Respirator Conference, Centre de Recherches Biologiques Neonatales, Paris, France.
——— "Pathophysiology and Methodology of Artificial Ventilation," Medical Staff, Alder Hey Hospital, Liverpool, England.
——— "Pathophysiology and Methodology of Artificial Ventilation," Medical Staff, University Children's Hospital, Lubeck, West Germany.
M. W. Thompson, "Significance of Dermatoglyphics in Detection of Patients with Abnormal Karyotypes," XII International Congress of Genetics, Tokyo, Japan.
——— "Contributions of the Human Blood Groups to Genetics," Antibody Club, Toronto.
——— "Genetics of Duchenne Muscular Dystrophy," Johns Hopkins University Medical School, Baltimore.
——— "Genetic Counselling in Duchenne Muscular Dystrophy," Downstate Medical Center, Brooklyn, N.Y.
J. A. P. Turner, "Chemoprophylaxis in Tuberculosis," Tuberculosis & Respiratory Disease Association of Southern Fairfield County, Connecticut.
——— "Functional Pulmonary Problems in Adolescence," American Academy of Pediatrics, Chicago, Ill.
——— "Tuberculosis Eradication—A Child-Centred Approach," Kent County Tuberculosis Association, Chatham, Ontario.

PUBLICATIONS

Anglin, C. S. *et al.* "An Adverse Reaction from Treating Warts with Vaccinia Virus" (*Canadian Medical Association Journal*, vol. 99, no. 3, July 20, 1968, p. 122).
Braudo, M., Beanlands, D. S., and Trusler, G. A. "Anomalous Drainage of the Right Superior Vena Cava into the Left Atrium" (*Canadian Medical Association Journal*, vol. 99, no. 14, Oct. 12, 1968, p. 715).
Carlson, J., Netley, C., Hendrick, E. B., and Pritchard, J. S. "A Reexamination of Intellectual Disabilities in Hemispherectomized Patients" (*Transactions of the American Neurological Association*, vol. 93, 1968, pp. 198–201).
Collins-Williams, C. "El Futuro de la Alergía Pediátrica" (*Alergia*, vol. 16–2, 1968, pp. 57–60).
——— "Hyposensitization Therapy in Allergic Disease" (editorial, *Canadian Medical Association Journal*, vol. 99, no. 17, Nov. 2, 1968, pp. 865–6).
——— "Treatment of the Acute Asthmatic Attack in Children" (*Applied Therapeutics*, vol. 11, no. 1, Jan. 1969, pp. 23–7).
——— "Urticaria and Angioedema"; in *Brennemann's Practice of Pediatrics*, ed. V. C. Kelley, chapter 65. Hagerstown, Maryland: W. F. Prior, 1968.
Collins-Williams, C. *et al.* "Deficiency of IgA in Serum and Respiratory Secretions" (*Canadian Medical Association Journal*, vol. 99, no. 22, Dec. 7, 1968, pp. 1069–72).
Ehrlich, R. M., Lynch, M. J., and Shandling, B. "An Arrhenoblastoma of the Ovary in an Adolescent" (*Canadian Medical Association Journal*, vol. 99, no. 23, Dec. 14, 1968, pp. 1140–2).
Hamilton, J. R. "Celiac Disease – Recipes" (A collection of tested recipes, 1968).
Hamilton, J. R., Lynch, M. J., and Reilly, B. J. "Active Celiac Disease in Childhood. Clinical and Laboratory Findings of Forty-two Cases" (*Quarterly Journal of Medicine*, vol. 38, no. 150, April 1969, pp. 135–58).
Hamilton, J. R. *et al.* "Blind Loop Syndrome in Children" (*Archives of Diseases in Childhood*, vol. 44, Feb. 1969, pp. 76–81).
——— "Intestinal Mucosa in Cystinosis" (*Archives of Pathology*, vol. 86, Sept. 1968, pp. 297–307).

——— "Short Small Intestine associated with Malrotation. A Newly Described Cause of Intestinal Malabsorption" (*Gastroenterology*, vol. 56, Jan. 1969, pp. 124–36).
——— "Tolerance of Young Children with Severe Gastroenteritis to Dietary Lactose: a Controlled Study" (*Canadian Medical Association Journal*, vol. 99, no. 20, Nov. 23, 1968, pp. 980–2).
Kooh, S. W., and Fraser, D. "Experimental Induction of Hypoparathyroidism with Parathyroid Hormone Antibodies"; in *Parathyroid Hormone and Thyrocalcitonin (Calcitonin)*, ed. R. V. Talmage and L. F. Belanger, pp. 442–4. Amsterdam: Excerpta Medica Foundation, ICS No. 159, 1968.
Kooh, S. W., Fraser, D. *et al.* "Appraisal of Renal Function and Histology after Long-term Vitamin D Therapy of Vitamin D Refractory Rickets" (*Journal of Pediatrics*, vol. 73, 1968, p. 833).
Lowden, J. A. "Asphyxia and Cerebral Gangliosides"; in *Drugs and Poisons in Relation to the Developing Nervous System*, ed. G. M. McKhann and S. J. Yaffe, p. 168. Bethesda: U.S. Public Health Service Publication #1791, Sept. 1968.
——— "Problems in the Study of Neuronal Development"; in *ibid.*, p. 76.
McClure, P. D. (with Choi, S. I., and Vranic, M.) "Thrombopoietic Activity in Idiopathic Thrombocytopenic Purpura" (*British Journal of Haematology*, vol. 15, Oct 1968, pp. 345–50).
McClure, P. D., and Choi, S. I. "Thrombopoietin and Erythropoietin Levels in Idiopathic Thrombocytopenic Purpura and Iron Deficiency Anaemia" (*British Journal of Haematology*, vol. 15, Oct. 1968, pp. 351–4).
Olley, P. M. *et al.* "Incidence of Systemic Embolism before and after Mitral Valvotomy" (*Thorax*, vol. 23, 1968, pp. 530–6).
Owen-Thomas, J. B., Ulan, O. A., and Swyer, P. R. "The Effect of Varying Inspiratory Gas Flow Rate on Arterial Oxygenation during IPPV in the Respiratory Distress Syndrome" (*British Journal of Anaesthesia*, vol. 40, July 1968, pp. 493–502).
Radde, I. C. *et al.* "Effect of Thyroid and Parathyroid on Hypocalcemia occurring after a Magnesium Load" (*Endocrinology*, vol. 83, 1968, pp. 1285–92).
Rance, C. P. "New Developments in the Management of Renal Diseases in Children – Parts I and II" (*Applied Therapeutics*, vol. 10, Aug. 1968, pp. 507–10; Oct. 1968, pp. 665–9).
Sass-Kortsak, A., Holmes, T. H. *et al.* "The Initial Uptake of Copper by the Liver in the Dog" (*Canadian Journal of Physiology and Pharmacology*, vol. 46, Sept. 1968, pp. 771–84).
Swyer, P. R., Carrier, C. *et al.* "Canadian Paediatric Society – Statement by the Committee on the Foetus and Newborn: Oxygen Therapy in the Preterm Infant" (*Canadian Medical Association Journal*, vol. 99, no. 11, Sept. 21, 1968, pp. 564–7).
Swyer, P. R. *et al.* "The Contribution to Venous Admixture by Shunting through the Ductus Arteriosus in Infants with the Respiratory Distress Syndrome of the Newborn" (*Biologia Neonatorum*, vol. 13, 1968, pp. 194–210).
Thompson, M. W. "Methodology in Human Genetics" (*Canadian Journal of Genetics and Cytology*, vol. 10, no. 3, Sept. 1968, pp. 747–53).
Thompson, M. W. *et al.* "Analysis of Effects of W and f Genic Substitutions on Fetal Mouse Hematology" (*Genetics*, vol. 58, pp. 259–70).
——— "Intelligence and the Gene for Muscular Dystrophy" (*Archives of Diseases in Childhood*, vol. 44, no. 234, April 1969, pp. 221–30).
Turner, J. A. P. *et al.* "The Protean Manifestations of Mycoplasma Infections in Childhood" (*Canadian Medical Association Journal*, vol. 99, no. 13, Oct. 5, 1968, pp. 633–7).

PATHOLOGICAL CHEMISTRY

Under the direction of Professor A. G. Gornall

A review of Departmental activities during the year will record steady progress towards our defined objective, which is to succeed in fostering the best means by which knowledge of the biochemistry and physiology of disease can be made to contribute to patient care. This objective has served as a basis for the recommendations on staff and facilities prepared in September, 1968, and approved by the Chairmen of Clinical Departments. It guided our thinking in preparing the Phase I and Phase II reports submitted to the Independent Planning Committee. It has provided a basis for staff recruiting and for the organization of divisions of clinical biochemistry in some of our hospitals.

We envisage for the future a university Department of Pathological Chemistry

composed of Divisions which in each hospital will be called Departments of Clinical Biochemistry. Each division will have an "academic" as well as a "service" section. We believe that the central offices of the Department of Pathological Chemistry should be on campus and that the Chairman should have a professorial research or service unit, but no administrative responsibilities, in one of the teaching hospitals. With occupancy of the Chair limited now to 5 or 10 years, it is imperative that the incumbent be able to maintain his professional activities on a secure part-time basis.

The Head of the Department of Clinical Biochemistry in each Hospital will be clinical biochemist-in-chief. He will have responsibility for both the academic and service sections of the Department and for co-ordinating their activities. If his professional interests relate to clinical chemistry, he will also be chief of service. There would then be a Deputy Head who in this instance would be director of the academic section. Alternatively, the Head might direct the academic section and the Deputy Head would be chief of service. The hospital Department Heads will co-ordinate their responsibilities to the Chairman through a Heads of Divisions Committee which will be the senior executive committee of the Department of Pathological Chemistry.

Until the academic space recommended for Clinical Biochemistry in our teaching hospitals comes into existence, the Banting Institute will remain the major research centre of the Department. In this location, staff for the various divisions are gradually being recruited and, as new hospital construction is completed, the Banting Division will ultimately be phased out entirely.

While affirming that progress is being made in areas that were a concern a year ago, particularly that of university–hospital relationships, it is necessary to record that other problems have not been resolved and a new one has emerged. The withdrawal of funds for renovation or refurbishing of laboratories seems bound to perpetuate a gradual deterioration of the Banting as a research institute. The limitation on budget increments to support graduate students, and provide technicians, supplies, and equipment, has meant that the departmental budget is actually less per member of staff than it was three years ago. During the past year a new concern has arisen because of the move to centralize control of animal facilities in the Faculty. This has led to the loss of a university subsidy that provided a veterinary director and other animal care amenities for research workers in the Banting Institute. Unless some of this subsidy can be diverted to departmental budgets, our staff may find their research potential curtailed for lack of sufficient funds to meet the higher charges for animal care.

Undergraduate Teaching

The coming year will be the last that our present course in Pathological Chemistry is presented primarily for medical students. The course itself will continue in a form modified slightly to make it more relevant for graduate students and candidates for the diploma in clinical chemistry. We hope to make it available as an option in fourth-year honour science and possibly as an elective for medical students who have set their sights on the fellowship in medical biochemistry.

We continue to feel some concern for the effectiveness with which the new curriculum in Period II will "provide an understanding of the pathochemistry and pathophysiology of the disease process." There has been a modest improvement in communication between the systems committee chairmen and this Department, particularly as they seek staff to implement their programmes. It is to be hoped that a fresh enthusiasm for teaching will counterbalance the limited experience of those guiding the new programme. As we relinquish somewhat reluctantly our responsibility for "developing a facility in the use of the hospital laboratory service and in the interpretation of the data it provides," we are acutely aware of the economic strain imposed by an indiscriminate use of laboratory services, and we know there is a desire among some of the resident staff for more postgraduate teaching in this area.

It is still the opinion of this Chairman that the system teaching should be managed in each hospital by a local committee consisting of a member of the Systems

Committee and a representative from each Department actually involved in the curriculum for that particular system.

Graduate Teaching

Graduate courses in the Department have continued to grow in importance. Under the guidance of Dr. N. Z. Stanacev our advanced course 1004 (Frontiers of Research) was presented by several members of staff to about 12 graduate students. Course 1005 (Clinical Chemistry) was given by Dr. C. J. Porter, assisted by a number of the clinical chemists on our staff. This course attracted a mixed group of graduate students, diploma candidates, and advanced technologists, numbering altogether about 55. Dr. Paul again presented course 1007 (Chemistry of Biological Systems) to engineering students in the Institute of Bio-Medical Electronics. With the assistance of Mrs. S. Bjerre he is developing a new course 1009 (Radioisotopes in Clinical Chemistry) intended primarily for diploma candidates.

A total of 14 graduate students were registered in the Department during the year and 2 additional students have recently begun work in the Department. Of these 5 are proceeding to the PH.D. and 11 to the M.SC. degree. Two candidates completed theses for the M.SC. degree during the year.

Postgraduate Teaching

Members of our staff contributed to the Advanced Postgraduate Course held last summer. The Department sponsored a half-day in the highly successful Refresher Course for Practising Pathologists. Dr. W. Paul was again moderator of the popular Annual Postgraduate Course on Radioactive Isotopes.

The Diploma in Clinical Chemistry got off to a good start with five candidates registered; two medical graduates and three postdoctoral biochemists. Available places for the coming year have been oversubscribed and the development of this programme is limited now by a lack of postdoctoral fellowships and training space in our hospital laboratories. New candidates for the Diploma Course will include O. P. Elebute, M.D., M.SC. from the University of Ibadan, Nigeria, W. S. Rickerts, PH.D. now on a fellowship in Denmark, and F. Jajczay, PH.D. from the University of Alberta.

A six-month Residency in Clinical Biochemistry, available at Sunnybrook Hospital and at the New Mount Sinai Hospital, has continued to be well received. Although intended mainly for those proceeding to the fellowship in medical biochemistry, it has attracted residents in other specialties as well.

STAFF

Banting Division

Professor J. A. Dauphinee has accepted an invitation to remain on staff in a part-time capacity for one more year. Professors W. Paul, N. Z. Stanacev, A. D. Baines, G. Feuer, and J. G. Silah have all made notable contributions to teaching and research in the Department. We were pleased to welcome Dr. K. M. Anderson to the staff as Assistant Professor in October. With a medical background and an impressive record as a PH.D. candidate at the University of Chicago, he has already established an active research programme here. We were in a position also to profit from the misfortune that had befallen Czechoslovakia. With the help of a Visiting Scientist Award from the Medical Research Council Dr. J. A. Kellen was invited in October to join our Department as Assistant Professor. With his medical and biochemical backgrounds Dr. Kellen has brought to the Department a wide experience in clinical biochemistry and in enzyme and immunochemical aspects of cancer research. We are doubly fortunate that he becomes a regular member of our staff in July.

It is a pleasure to record that Dr. C. C. Liew, after a successful year at the University of Sussex in England, has had his Canadian Heart Foundation Fellowship

renewed for a second postdoctoral year at Rockefeller University in New York. We are expecting him to join our professorial staff in 1970.

The acquisition of new staff created a need for more space and an allocation of additional laboratories on the fifth floor of the Banting Institute has provided great encouragement.

Hospital Divisions

The Heads of the Clinical Biochemistry Departments in our teaching hospitals hold senior appointments in Pathological Chemistry and constitute a major advisory committee of the Department. Drs. S. H. Jackson, A. Malkin, C. J. Porter, A. Pollard, and A. Rapoport have made important contributions to Departmental policy decisions, and Dr. R. R. Ogilvie and Mr. M. O'Sullivan have assisted with planning in their respective hospitals.

The Department has been pleased to welcome Dr. D. Lovell as Assistant Professor on the staff at Sunnybrook Hospital. Dr. R. W. Moore, a postdoctoral candidate in the Diploma Course, completes his training and will join our staff at Sunnybrook as Lecturer in September.

There have been encouraging developments in the reorganization of the Department of Clinical Biochemistry at the Hospital for Sick Children. This has brought the biochemistry resources of the Research Institute into a relationship with the Clinical Chemistry service that should be of great benefit to our graduate and postgraduate programmes.

A proposal under which the Department of Laboratories at the Toronto General Hospital will be reorganized into three Departments, one of them Clinical Biochemistry, is expected to facilitate a closer integration of university and hospital objectives.

There is reason to believe that a reorganization at the Wellesley Hospital will provide a Department of Clinical Biochemistry there within another year.

Visiting Lecturers to the Department during 1968–69 included Dr. Milan Hašek from the Czechoslovak Academy of Sciences, Dr. G. W. G. Sharp from the Massachusetts General Hospital, and Dr. F. W. Matthews from Canadian Industries Ltd., Montreal. Dr. Murray Saffran from McGill University spent a memorable week as Visiting Professor in the Department during February.

RESEARCH

Banting Division

Under the guidance of Professor A. G. Gornall work on the endocrinology and metabolism of heart muscle, and studies of enzyme structure have continued. Mrs. B. J. Cadeau, candidate for the PH.D. degree, could find no significant effect of adrenalectomy or of aldosterone on heart muscle dinucleotides. She has, however, succeeded in developing a gas–liquid chromatographic method for determining both the amount and specific activity of tricarboxylic acid cycle intermediates. This is being used to study substrate turnover in the isolated perfused rat heart. Miss Lynda C. Tyrrell, M.SC., has collaborated in a study of RNA polymerase activity of purified heart cell nuclei. No consistent changes in this enzyme could be demonstrated following adrenalectomy or aldosterone administration. The capacity of rat heart to form ATP was found to be increased by aldosterone and the dependence of this effect on NAD, substrate and other factors is being explored. Mrs. M. Kandel, with the collaboration of Dr. S. Kandel of the Faculty of Pharmacy, has continued her investigation of the active site of bovine carbonic anhydrase and has confirmed the existence of a second reactive site, different from the primary active site, which appears to contain a carboxyl group. Comparison of isoenzymes of carbonic anhydrase from different species has revealed similarities between those isoenzymes possessing high catalytic activity and differences between the isoenzymes of high and low catalytic activity. Miss A. Britton, with the collaboration of Dr. C. Ezrin of the

Department of Medicine and Dr. D. J. Gare of the Department of Obstetrics and Gynaecology, has made a study of thyroxin and triiodothyronine binding by human placenta. It has been shown that dilute lipid solvents have a marked effect on the binding properties of the tissue, suggesting that the binding sites for these hormones are dependent on the integrity of a lipid protein complex. In all this work the support of the Medical Research Council of Canada and the Ontario Heart Foundation is gratefully acknowledged.

Professor J. A. Dauphinee has continued his investigations of the arginase activity in the plasma of normal individuals and of various patients in order to find out if a determination of such activity can be of help in the differential diagnosis of the jaundiced person. The many inconsistencies in the results obtained by described procedures has made it necessary to spend considerable time in improving the method used for the accurate quantitation of the very small amounts of this enzyme normally present in the plasma. A partially satisfactory procedure has been developed and tentative answers suggest that the plasma arginase may be appreciably elevated in patients with varying degrees of hepatocellular necrosis. The copper metabolism of nine new patients with neurological complaints has also been investigated, and it was possible in this way to exclude Wilson's Disease as a cause of their illness.

Professor W. Paul has continued his research on the development of a gamma-ray camera based on the utilization of optical image amplifiers. Mr. M. Joy, candidate for the PH.D. in Bio-Medical Electronics, has defined the essential physics of gamma-ray absorption in small crystals, and the parameters of optical amplifiers. A clinically useful instrument is now under construction. During the year a new oximeter, based on commercially available solid state components and using the RCAF earpiece, was assembled and tested. The next stage will be to refabricate the earpiece, using the unique concepts of its design to achieve a usable transducer. Dr. Paul has acted as co-supervisor of the M.SC. programme of Dr. M. L. Schwartz, whose research deals with the autoradiographic localization of steroids in brain.

Professor N. Z. Stanacev, aided by F. J. Carmichael, candidate for the PH.D. degree, and J. B. Davidson, special student, and by research assistants Mrs. K. B. Brookes and Mrs. L. A. Stuhne, has succeeded in establishing the pathways for the biosynthesis of phosphatidylglycerol and phosphatidylglycerophosphate in isolated mitochondria from brain and heart muscle. The enzymatically formed products have been characterized and chemical and enzymatic degradations of these polyglycerophosphatides performed. The intracellular distribution of the enzymes involved in the biosynthesis of phosphatidylglycerol has also been established. Studies of phospholipid biosynthesis in the ventral prostate have been made in collaboration with Dr. K. M. Anderson.

Professor A. D. Baines has directed a study of variations in glomerular and proximal tubular function between nephrons located on the surface of the kidney and those located near the medulla. Alterations in the ratio of superficial to deep nephron function have been implicated as causally linked to changes in water and sodium output in the urine. Mr. K. E. Y. Tabello, candidate for the PH.D. degree, is examining the excretion of water and sodium by rat kidneys in which chronic pyelonephritis has been induced. Miss C. A. Davis, B.SC., is developing an ultramicromethod for the measurement of glucose in nanolitre samples.

Professor G. Feuer has directed the work of S. D. Cooper, candidate for the PH.D. degree and Miss P. A. Gibbs, M.SC. candidate. Their investigations on the effects of foreign compounds on the biochemical organization of the liver cell have shown: (a) In the induction of drug metabolizing enzymes a correlation exists between chemical structure and inductive capacity. (b) A significant difference exists between hepato-toxic compounds and drugs in their action on the endoplasmic reticulum. Hepatotoxins alter the activity of microsomal phosphatases, drugs induce microsomal drug metabolizing enzymes. (c) An interaction has been observed between hepatotoxins and drugs on microsomal enzymes indicating a common site of attack. (d) Drug metabolism is reduced during pregnancy. (e) The delayed synthesis

of drug metabolizing enzymes in the fetus and newborn rat is probably connected with endogenous inhibitory factors.

Professor J. G. Silah has directed the work of Dr. G. Turcotte, candidate for the M.SC. degree. A method for studying the sulfoconjugation of corticosterone has been established. The *in vitro* capacity for sulfoconjugation of livers from rats made hypertensive by the Grollman procedure was found to be remarkably greater (45.5 per cent) than the capacity of livers from normotensive rats (18.8 per cent). Conditions were also established for assay of the enzyme reducing the Δ^4—3 ketone of ring A of the steroid nucleus. Liver from hypertensive rats showed a 1.3–4.6 fold greater capacity to reduce ring A than livers from normotensive rats. The significance of these alterations in steroid metabolism is not yet clear.

Professor K. M. Anderson has directed the work of Dr. O. P. Elebute, candidate for the PH.D. degree, and of F. H. Lee, special student. Studies concerning protein synthesis in isolated liver cell nuclei and nuclei from the rat ventral prostate are being pursued, along with the influence of insulin and testosterone on this process. The effect of testosterone on RNA synthesis by rat ventral prostate mitochondria has been investigated. With Mr. H. Kohn, medical summer student, the binding of testosterone and its metabolites by rat thymus and possible effects on RNA polymerase are being examined. In collaboration with Dr. N. Z. Stanacev the effect of androgen on rat ventral prostate phospholipid synthesis is under study. In collaboration with Dr. J. A. Kellen the induction of rat mammary carcinoma by 7,12-dimethylbenz(α) anthracene is being investigated.

Professor J. A. Kellen has resumed his research on the determination and definition of tumour-specific enzymes and is directing the work of V. Lustig, M.SC. candidate. They are investigating the intracellular localization of tissue phosphatases. Also under study is the peculiar effect of amino acids on alkaline phosphatases from different tissues. There is a definite pattern of inhibition or activation for amino acids depending on their molarity and stereospecificity, and the tissue source of the alkaline phosphatase. The alkaline phosphatase in amniotic fluid differs from the placental enzyme and shows a surprising activity at 0° C. Alkaline phosphatases from tumours on the other hand are notable for their thermo stability at 56° C.

Hospital Divisions

At the Toronto General Hospital Dr. C. J. Porter has worked on new methods for agarose-gel electrophoresis, body fluid proteins, lactic dehydrogenase and alkaline phosphatase isoenzymes, and the development of a procedure for Ca and Mg by atomic absorption spectrophotometry. Dr. J. Armstrong has studied automated procedures for albumin and globulin. Mrs. S. Bjerre has investigated assay procedures for lactic dehydrogenase, glucose-6-phosphate dehydrogenase and serum lipase, drug analysis by infrared analysis, lipoprotein electrophoresis and automated simultaneous cholesterol/triglyceride, enzymes in amniotic fluid, and estrogens in urine.

At the Toronto Western Hospital Dr. A. Rapoport and Dr. H. Husdan have completed their study of a standardized dehydration test of renal function, which has been applied to large groups of normals and patients with kidney disease. They are also studying the factors influencing the urinary excretion of hydroxyproline, an amino acid arising chiefly from bone collagen. They have embarked on a long-term study of the correlation between the various parameters used in the assessment of bone disease. Dr. Husdan has developed an improved procedure for the analysis of Ca, Mg, and P in diet and stool. Dr. S. Dubiski has continued his fruitful studies on problems related to antibody synthesis and structure. In particular the phenomenon of "allotypic suppression" and the process of commitment of lymphoid cells to antibody production have been studied. Dr. R. R. Ogilvie has investigated automated procedures for the measurement of serum transaminase and the problem of linearity in the fluorometric procedure for calcium.

At Sunnybrook Hospital Dr. D. Z. Borensztajn has worked out a method for sampling blood from the hypophysial portal system. Anterior pituitary cells grown

in tissue culture are expected to serve as an assay system for hypothalamic releasing factors present in the portal blood. In collaboration with Dr. W. E. Boothroyd of the Department of Psychiatry a study of the biochemical changes in the manic-depressive syndrome has been initiated. Clinical symptom ratings are being compared with the excretion of corticosteroid and monoamine metabolites.

At St. Michael's Hospital Mr. M. O'Sullivan and Mrs. G. C. Buckley have continued their studies of lipid disorders in collaboration with Dr. J. A. Little of the Department of Medicine. Laboratory screening procedures have been evaluated and a survey of 240 subjects completed.

At the Hospital for Sick Children, Dr. S. H. Jackson has directed the work of J. A. Heininger, M.SC. candidate. Studies are continuing on the extent of reutilization of mature collagen in the regeneration of new collagen. A metabolic screening programme has turned up a number of cases of anomalies of amino acid metabolism which are being followed in collaboration with Dr. A. Sass-Kortsak of the Department of Pediatrics.

At the New Mount Sinai Hospital Dr. A. Pollard is experimenting with the design and construction of an apparatus for the automation of radioimmunoassays. He is co-supervisor with Dr. S. L. Cohen of M.SC. candidate Miss F. Timanoff, who is studying the problem of estrogen assays in urine.

At the Ontario Cancer Institute Dr. B. Cinader has studied a type of enzyme antibody which augments enzyme activity and has shown that this antibody changes the configuration of the enzyme molecule and alters its specificity for substrate. Studies of the genetic control of antibody response have been pursued with the collaboration of Dr. C. T. Chou and Dr. S. Dubiski, and of genetic factors which control tolerance induction and tolerance breakdown in collaboration with Dr. J. E. M. St. Rose. The complement deficiency of certain inbred mice has been used to investigate the phenomena of immunosuppression of antibody against allotypes (with Dr. Dubiski and Mrs. S. Koh) and of antilymphocyte serum (with Mrs. Koh and Dr. H. F. Jeejeebhoy).

At the Clarke Institute Dr. D. D. Godse has collaborated with Dr. H. C. Stancer of the Department of Psychiatry in a study of the effect of lithium on recurrent depression. Methods for the continuous monitoring of plasma constituents such as cholesterol and free fatty acids have been developed for psychobiochemical application.

At the Medical Unit of the Addiction Research Foundation Dr. J. S. Olin and his colleagues have continued their extensive multidisciplinary studies on the consequences of addiction to alcohol.

HONOURS

Dr. B. Cinader has been elected Chairman of an International Union of Immunological Societies.

Dr. S. Dubiski is Secretary of the Canadian Society for Immunology.

Dr. J. G. Hill is President-elect of the Ontario Society of Clinical Chemists.

Dr. A. Rapoport was awarded the William Goldie Prize in 1968.

Dr. N. Z. Stanacev was elected a Fellow of Massey College in May 1969.

SCHOLARLY ADDRESSES

Third International Symposium on Drugs affecting Lipid Metabolism, Milan, September 1968: Dr. G. Feuer, "Drug Effects, Lipid Solubility and Hepatic Phospholipids."

IVth International Congress of Nephrology, Stockholm, Sweden, June 1969: Dr. A. D. Baines, "Absorption of Acidic Amino Acids from Proximal Tubule Fluid," "Filtration Rate of Single Superficial and Deep Glomeruli during Different States of Diuresis."

Royal College of Physicians and Surgeons, Vancouver, January 1969: Dr. A. Rapoport, "The Clinical Assessment of Renal Concentrating Capacity."

Dalhousie University's Faculty of Medicine Centennial, Halifax, September 1968: Dr. B. Cinader, "Immune Recognition and Transplant Tolerance."

Institute for Animal Behaviour, near Munich, Germany, May 1969: Dr. B. Cinader, "Genetic Problems in Immunobiology."

Atomic Absorption Symposium by Spectrex, Toronto, June 1969: Dr. C. J. Porter, "Biomedical Application of Atomic Absorption Spectrophotometry."

Canadian Society of Chemotherapy 5th Annual Meeting, Toronto, April 1969: Dr. B. Cinader, "Immunosuppressive Agents and Chemotherapy"; Dr. G. Feuer, "Effect of Drugs on Hepatic Drug Metabolism in the Fetus and Newborn."

Washington, D.C., August 1968, at combined 20th National Meeting, American Association of Clinical Chemists and 12th Annual Meeting Canadian Society of Clinical Chemists: Dr. H. Husdan, "The Estimation of Calcium, Magnesium and Phosphorus in Diet and Feces"; Dr. D. D. Godse, "Chemical Aspects of Continuous *in vivo* Determination of Plasma Cholesterol."

Canadian Federation of Biological Societies 12th Annual Meeting, Edmonton, June 1969: Mrs. M. Kandel, "Covalent Interaction of Bovine Carbonic Anhydrase B with Bromoacetazolamide"; Dr. G. Feuer, "Effect of Foreign Compounds on the Enzyme Activity of the Hepatic Endoplasmic Reticulum."

Stockholm, Sweden, Karolinska Institute, May 1969: Dr. B. Cinader, "Allelic Interaction and Exclusion in Cells of the Antibody-forming Apparatus."

Institute Pathologia Medica II, University of Milan, September 1968: Dr. G. Feuer, "Mechanism of Detoxication and Connection with the Treatment of Hyperbilirubinaemia."

Czechoslovakia Academy of Sciences, Institute of Organic Chemistry and Biochemistry, Bratislava, June 1969: Dr. A. D. Baines took part in Symposium on "Natriuretic Hormone."

Ontario Society of Medical Secretaries Annual Meeting, March 1969: Dr. R. R. Ogilvie, "Hospital Biochemistry."

British Industrial Biological Research Association, Carshalton, England, September 1968: Dr. G. Feuer, "Differences in Hepatic Response to various Coumarins in the Rat."

17th Annual Colloquium on Protides of the Biological Fluids, Brugge, Belgium, April–May, 1969: Dr. S. Dubiski, "Does Antibody Synthesis involve Somatic Recombination?"; Dr. B. Cinader, "Allotypy as a Probe."

The College of General Practice, Toronto, February 1969: Dr. J. S. Olin, "The Use of the Laboratory and the Management of Bone Diseases."

Third International Congress of Endocrinology, Mexico City, July 1968: Dr. S. L. Cohen, "The Excretion of Total Estrogens in Pregnancy Urine."

5th Meeting of Federation of European Biochemical Societies, Prague, July 1968: Dr. B. Cinader, "Study of Cell Populations in terms of Antibody Characteristics"; Dr. S. Dubiski, "Phenotypic Expression of Immunoglobulin Genes."

PUBLICATIONS

Apella, E., Mage, R. G., Dubiski, S., and Riesfeld, R. A. "Chemical and Immunochemical Evidence for Different Classes of Rabbit Light Polypeptide Chains" (*Proceedings of the National Academy of Sciences*, vol. 60, no. 3, July 1968, pp. 975–81).

Baines, A. D., Baines, C. J., and De Rouffignac, C. "Functional Heterogeneity of Nephrons. I. Intraluminal flow velocities" (*Pflügers Archiv für die Gesamte Physiologie*, vol. 308, no. 3, May 1969, pp. 244–59).

Baines, A. D., and De Rouffignac, C. "Functional Heterogeneity of Nephrons. II. Filtration rates, intraluminal flow velocities and fractional water reabsorption" (*ibid.*, pp. 260–76).

Baines, A. D., Leyssac, P. P., and Gottschalk, C. W. "Proximal Luminal Volume and Fluid Reabsorption in the Rat Kidney" (*Acta Physiologica Scandinavica*, vol. 74, no. 3, 1969, pp. 440–52).

Bjerre, S., Gold, C. C., Wilson, S., and Doran, T. A. "Amniotic Fluid Spectrophotometry, Urinary Estrogen Estimations, and Intrauterine Transfusion in Severe Rh Isoimmunization" (*American Journal of Obstetrics and Gynecology*, vol. 102, no. 2, Sept. 1968, pp. 275–83).

Cohen, S. L. "Removal of Substances Interfering with the Rapid Assay of Estrogen in Pregnancy Urine" (*Journal of Clinical Endocrinology and Metabolism*, vol. 29, no. 1, Jan. 1969, pp. 47–54).

Douglas, D. M., Forrester, J. C., and Ogilvie, R. R. "Physical Characteristics of Collagen in the Later Stages of Healing" (*British Journal of Surgery*, vol. 56, no. 3, March 1969, pp. 219–22).

Dubiski, S. "Regulation of the Synthesis of Allotypically Defined Immunoglobulins"; in *Regulation of Antibody Response*, ed. B. Cinader, pp. 182–203, New York: Charles C. Thomas, 1968.

Jackson, S. H. "Urinary Sulfur Excretion and Whole Body Protein Catabolism. The Effects of Burns, Age and Protein Restriction" (*Clinica Chimica Acta*, vol. 22, no. 3, Nov. 1968, pp. 443–53).

Jackson, S. H., and Elliott, T. G. "The Origin of the Urinary Peptide Hydroxyproline in Burns" (*Clinica Chimica Acta*, vol. 23, no. 1, Jan. 1969, pp. 97–103).

Jackson, S. H., Sardharwalla, I. B., and Ebers, G. C. "Two Systems of Amino Acid Chromatography suitable for Mass Screening" (*Clinical Biochemistry*, vol. 2, no. 2, Dec. 1968, pp. 163–7).

Kellen, J. "The Serum Beta-lipoproteins in Different Human Malignant Diseases" (*Neoplasma*, vol. 15, no. 2, 1968, pp. 139–43).

Kellen, J., and Hrivnakova, A. "Thermostable Glutamate-Oxalacetate Transaminase in Neoplastic Diseases" (*Neoplasma*, vol. 16, no. 1, May 1969, pp. 71–4).

Liew, C. C., and Gornall, A. G. "Effects of Aldosterone on Blood Pressure and Glucose-6-Phosphate Dehydrogenase Activity of Heart Muscle" (*Canadian Journal of Physiology and Pharmacology*, vol. 47, no. 2, Feb. 1969, pp. 193–7).

——— "Effects of Aldosterone on the Incorporation of ^{32}P into the Nucleotides of Heart Muscle" (*Canadian Journal of Biochemistry*, vol. 47, no. 4, April 1969, pp. 461–6).

Moody, N. F., Joy, M., and Paul, W. "A Versatile Gamma Ray Camera for Dynamic or Static Studies in Medicine" (*IEEE Transactions on Nuclear Science*, vol. NS-16, no. 2, April 1969, pp. 3–18).

Nowaczynski, W., Fragachen, F., Silah, J., and Millette, B. "Further Evidence of Altered Adrenocortical Function in Hypertension" (*Canadian Journal of Biochemistry*, vol. 46, no. 9, Sept. 1968, pp. 1031–8).

Rapoport, A., and Husdan, H. "Endogenous Creatinine Clearance and Serum Creatinine in the Clinical Assessment of Kidney Function" (*Canadian Medical Association Journal*, vol. 99, no. 4, July 27, 1968, pp. 149–56).

Sardharwalla, I. B., Jackson, S. H., Hawke, H. D., and Sass-Kortsak, A. "Homocystinuria: A Study with Low Methionine Diet in Three Patients" (*Canadian Medical Association Journal*, vol. 99, no. 15, Oct. 19, 1968, pp. 731–40).

Stanacev, N. Z., Stuhne-Sekalec, L., Brookes, K. B., and Davidson, J. B. "Intermediary Metabolism of Phospholipids. The Biosynthesis of Phosphatidylglycerophosphate and Phosphatidylglycerol in Heart Mitochondria" (*Biochimica et Biophysica Acta*, vol. 176, no. 3, April 29, 1969, pp. 650–3).

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PATHOLOGY

Under the direction of Professor A. C. Ritchie

Much good work has been accomplished during the past year. Our teaching programmes, our research work, and our clinical work have all been improved and expanded. These benefits do, however, emphasize the narrow restrictions within which we are confined. Rather than seek that broad excellence which should be the mark of the University, we have had to confine our forces to ensure that our most important responsibilities are adequately met. Except in those hospitals in which new construction is being completed, the facilities available to Pathology are inadequate. We have neither the men nor the facilities to meet all the demands which are properly made upon us. During the year, these difficulties have been considered in detail, and are set out in our Brief to the Independent Planning Committee. It seems clear that only from new construction can we acquire the space to house the staff needed to meet our responsibilities in the University.

The courses in General Pathology and Special Pathology for Medical Students were co-ordinated by Dr. J. A. Hayes. In General Pathology, the majority of the lectures were again given by Dr. A. C. Ritchie, to ensure that continuity discussed in last year's report. In Special Pathology, the different systems were discussed by different lecturers, as in the past. The course on haematological disorders, given to the students in the third medical year, was again co-ordinated with that given in the Department of Medicine. Both in General and Special Pathology, much more time was devoted to seminar discussions, with less time given to the demonstration and discussion of fresh tissue from autopsy or surgery. This pattern is more similar to that proposed for Period II of the New Curriculum, but the change did not find favour with staff or students. The seminars were difficult for the staff, and often seemed of less benefit to the students than other forms of instruction. The reduction in the time spent with fresh tissue proved to be particularly undesirable. The students' understanding of the physical nature of disease processes and their effect on the patient was weakened, and the value of the course as an introduction to clinical medicine lessened. Dr. Hayes introduced a new form of multiple-choice practical examination, which had many advantages over the types of practical examination used in the past.

The course in General Pathology for Dental Students was again directed by Dr. N. S. Taichman. While the general form of lecture and demonstration was preserved, the orientation of the course towards dentistry, emphasizing the application of pathological principles to dentistry, was developed further, to considerable advantage.

The lecture course for students of Physical and Occupational Therapy was organized by Dr. Susan Ritchie. The Department also shared in the courses arranged by the Canadian School of Embalming and the Toronto Institute of Pastoral Training.

The core of the postgraduate programme continued to be residency training of the usual type. The men in training were assigned to one of the Teaching Hospitals, and most worked in some aspect of anatomical pathology, autopsy work, surgical pathology, cytopathology, or neuropathology. Those training in general pathology also rotate through haematological pathology, bacteriology, and clinical chemistry. The first trainees for the new Fellowships in Haematological Pathology and Neuropathology entered the residency programme. New postgraduate seminars on ultrastructural anatomy and on laboratory haematology were arranged by Dr. Simon and Dr. Pinkerton. This aspect of our work will have to be expanded considerably. It is clear that with the growing complexity of medicine, residency training will need to be supplemented more systematically with such course work.

The heavy load of lectures and seminars for those training in specialties other than pathology continued, with the burden falling very heavily on Dr. Anderson and a few other members of the staff. This work is valuable, and indeed might be expanded and improved with great advantage, but must be reorganized to spread the work more evenly.

Dr. Simon again gave an Introductory Course in Electron Microscopy. This proved both popular and valuable, and is another area which should be accepted, and developed.

The Refresher Course for Pathologists in Practice was directed by Dr. H. T. G. Strawbridge, and as previously was given in collaboration with the Departments of Pathological Chemistry and Bacteriology. Some 45 pathologists from across the country registered. The programme was well received. It is clear that this course meets a need, and that it deserves full support. Other such courses would be very desirable. In particular, a course in forensic pathology seems badly needed.

In the Graduate School, Dr. Movat organized a series of lectures on various aspects of experimental pathology.

All these didactic programmes should be expanded, and there are several others that should be introduced. The chief problem is that most members of the staff are

already overtaxed and cannot find time for new responsibilities. It must be remembered that to give a lecture well does not take one hour of the lecturer's time, but many hours. For most of the staff, this time is not available. Indeed, it is hard to find sufficient time for the reading essential to keep up to date, and time for research and investigation is too often impossible.

During the year, the division of general and experimental pathology moved into the Medical Sciences Building. Dr. Movat, Dr. Taichman, Dr. Udaka, and Dr. Ranadive are now working in the unit.

Several new members joined the staff during the year. Dr. N. S. Ranadive came from La Jolla to join the division of General and Experimental Pathology, and Dr. M. M. Fisher returned from Pittsburgh to take up an appointment conjointly in Pathology and Medicine. Dr. K. Carstairs from London, England, joined the Division of Haematology at the Toronto General Hospital, and Dr. T. A. Harper of Manchester, England, the Department of Laboratory Haematology at Sunnybrook. Dr. A. P. van Nostrand returned from the University of Cambridge and the Royal Postgraduate School to join the staff of the Toronto General Hospital; Dr. J. Deck from the University of California to the Toronto Western Hospital; and Dr. V. Fournasier from the Royal National Orthopaedic Hospital, London, England, to the Wellesley and Princess Margaret Hospitals. On completing their training, Dr. H. A. Gardner and Dr. M. J. Ball joined the staff of the Toronto General Hospital and Dr. D. I. Turnbull the staff of the Hospital for Sick Children.

During the year, Dr. A. Ozge-Anwar of the Department of Laboratory Haematology at Sunnybrook and Dr. B. Oliver of the Toronto Western Hospital resigned their appointments.

Among the distinguished visitors to the Department were Dr. P. J. Goldblatt of the University of Pittsburgh; Dr. T. B. Teoh of Hong Kong; Dr. R. O. Recknagel of the Case Western Reserve University in Cleveland; Dr. T. M. Cowan of the London Hospital Medical College; Professor P. Herdson of the University of Auckland; Dr. E. R. Gabrieli of Buffalo; Professor R. Hudson of the National Heart Hospital in London; Professor O. Bjarnson of the University of Iceland; Dr. N. P. Napalkov of the Institute of Oncology in Leningrad; Professor G. Forbes of the University of Glasgow; Dr. G. Baroldi of the Institute of Morbid Anatomy, Milan; Dr. R. Hassler of the Max-Planck Institute for Brain Research of Frankfurt; Dr. I. Klatzo of the National Institutes of Health, Bethesda; Dr. R. Terry of the Albert Einstein College of Medicine, New York; Dr. F. K. Austin, Harvard Medical School; Dr. J. Rockey, University of Pennsylvania; Dr. E. Kabat, College of Physicians and Surgeons of Columbia, New York; Dr. Alice Johnston, Woodruff Medical Centre of Emory University; Dr. K. Bloch, Massachusetts General Hospital; Dr. K. Ishizaka, University of Colorado; Dr. E. Becker, Walter Reed Army Medical Centre; Dr. P. Henson, Scripps Clinic and Research Foundation.

Division of Neuropathology

As in previous years the course of Neuropathology lectures was given to the Third Medical Year in the fall of 1968 by Dr. Rewcastle, assisted by Dr. Deck and Dr. Humphrey. The practical teaching had previously been completed towards the end of the Second Year. In addition, tutorial-demonstrations were provided to the Second Medical Year but differed a little in organization from previous years. With the assistance of Dr. Hayes, it was arranged that only one tutorial session would be held each week, over a nine-week period. By doing this we were able to obtain the useful assistance of Drs. Deck, Medline, and Platts from the Toronto Western, St. Michael's, and Wellesley Hospitals, respectively. In previous years the practical course had been given over a three-week period with three identical presentations in any one week. Under this arrangement, it was impossible to obtain the services of men in the aforementioned hospitals with any consistency.

The Division has been active in the training of residents and the majority of the latter are still drawn from clinical training programmes. However, the introduction of the Fellowship examination in Neuropathology is already showing signs

of attracting men into this specialty. From September through May there has been an active teaching programme, including gross brain cutting sessions, gross and microscopic conferences, clinical pathological presentations, and weekly seminars, the latter being presented as an overall course in Neuropathology.

The Division has continued to provide service coverage in the field of Neurosurgical material and nervous system examinations of autopsy material for the Toronto General Hospital. In addition, the staff of the Division have acted in a largely unpaid consultant capacity for material submitted from wide areas of the Province. Such wet tissues received, which require technical work within our laboratory, amount to roughly 10 per cent of our service work.

Members of our technical staff, Miss Weyer with the assistance of Mrs. Fetherston, have participated in the presentation of courses at the Toronto Institute for Medical Technologists.

RESEARCH

In the Banting Institute, studies on carcinogenesis have continued, with Dr. Miyai, Dr. Raick, Dr. Mansour-Bishai, Dr. Moscarello, Dr. Simon, and Dr. Ritchie active in the work.

The phorbol isolated from croton oil by Professor Jones of the Department of Chemistry has been found to have great power in promoting epidermal carcinogenesis in the mouse, and Dr. Raick is now studying its effects on the epidermis, using light and electron microscopy, and is determining its effect on the mitotic cycle. Dr. Raick is also continuing to study the inhibition of mitosis induced when dimethyldibenzanthracene is given in the hours after partial hepatectomy.

Dr. Miyai is continuing his work with ethionine, with particular attention to the natural recovery from ethionine injury to the liver, to the effects of glucuronic acid on the changes induced in the liver, and to the effects produced by ethionine in the nucleolus. In collaboration with Dr. Jackson of the Department of Surgery, he is also beginning a study of the effects of ultrasound on tissue culture cells.

Dr. Moscarello and Dr. Mansour-Bishai are purifying the active principles of the chalone from pork skin, and have shown that the fraction most active as tested in mouse skin binds dimethylbenzanthracene.

Also in the Banting Institute, Dr. Simon with Dr. Burke and Dr. Schnuda has been studying the normal structure of the spleen, and its reaction to antigenic and non-antigenic particles. This work is being extended, and similar studies of the structure and function of lymph nodes are being begun. With Dr. Curry, Dr. Simon has investigated the fine structure of the mouse lung, and the histogenesis of the tumours induced in the lung by uracil mustard.

Dr. Pinkerton, with Dr. Bédard and Dr. Simon, is studying the x-linked anaemia of the mouse, using electron microscopy to determine how iron is taken up in the small bowel, and the nature of the defect in the animals with the anaemia.

Dr. Silver spent three months at the National Heart Hospital in London. With Dr. Gardner, he has studied the effect of various fixatives used in electron microscopy on platelet structure, the localization of serotonin in the platelet, and the changes which occur in the platelet and megakaryocyte during its uptake and release. With Mr. Lam and Dr. Ranganathan, Dr. Silver is reinvestigating the anatomy of the mitral valve, with particular relation to the prolapse of the posterior leaflet. With Dr. Trimble, Dr. Goldman, and Dr. Heimbecker of the Department of Surgery, he is studying the changes which occur in the heart during transplantation, and the effect of anoxic arrest on the myocardium.

Dr. Hayes has been investigating the ultrastructural changes in the vessels in experimental pulmonary oedema, and the effects of pulmonary lavage with oxygenated saline under hyperbaric conditions. With Dr. Woolf of the Department of Medicine and others, he has studied the lung in cases of emphysema treated surgically.

Dr. Anderson with Dr. Macnab and Dr. Rathbun of the Department of Surgery has studied the microcirculation in the rotator cuff of the shoulder, and with Dr. Macnab and Dr. Duckworth of the Department of Anatomy has investigated the nerve supply to tendons, and its relationship to painful arthritis. With Dr. Bryce of the Department of Otolaryngology, he has studied the premalignant and cancerous changes in the larynx, an investigation supported by the Conacher Foundation.

With Dr. Harkins and Dr. Doran of the Department of Obstetrics and Gynaecology, Dr. Thompson has completed an appraisal of the progestational agent BD-1298. With Dr. Delarue of the Department of Surgery, he is continuing the follow-up to determine the significance of circulating tumour cells in the blood, and with Dr. Doran is correlating the presence of circulating tumour cells with the histological and clinical features, and the follow-up in cases of carcinoma of the endometrium. With Dr. Delarue, Dr. Thompson is studying cases of carcinoma of the lung, comparing the histological type, the size, the involvement of nodes, and the involvement of vessels and correlating these factors with survival. Dr. Thompson and Dr. Delarue are also examining the effect of various chemotherapeutic agents used in therapy. With Dr. Delarue, Dr. Pearson and others, Dr. Thompson is studying the effectiveness of cytological screening in detecting carcinoma of the lung in smokers, and with Dr. Woolf of the Department of Medicine is studying the cytological changes in the sputum of women smokers, and comparing the findings with respiratory function tests. With Dr. Doran, Dr. Thompson is comparing the techniques of sampling in vaginal smears from post-menopausal women with the histological and clinical abnormalities found, and is assessing foetal maturity by examining samples of amniotic fluid obtained by intrauterine aspiration. With Dr. Francis, Dr. Allemang, Dr. Allin, and others, Dr. Thompson is assessing the effect on cytohormonal patterns of various birth control medications, and is determining their short- and long-term effects, including changes in the vaginal flora.

Under the auspices of the Canadian Association of Pathologists, Dr. Young has served as a principal investigator in a re-evaluation of the Dominion Bureau of Statistics' unit for clinical laboratory procedures.

Mrs. Crookston has continued her work on the antigens and antibodies in health and disease, and has studied the serological abnormalities in the blood of patients with hereditary dyserythropoietic anaemia.

Dr. Musclow has established a cytogenetics laboratory and has studied a number of cases. This work has now been taken over by Dr. Gardner.

Dr. Carstairs is investigating the localization of transferrin in the tissues.

With Dr. Goluboff and Dr. Sellers of the Department of Pharmacology, Dr. Ezrin is investigating whether one type of pituitary cell can turn into another, by determining whether thyrotrophs can return to a resting chromophobic state, and whether such cells can be subsequently stimulated by causing hyperplasia of the cells which secrete gonadotrophic hormone. With Dr. Goluboff, he has investigated the reaction of the two types of acidophil cell in the pituitary during pregnancy, and is continuing his work on the use of antibodies to localize the cells of origin of the pituitary hormones, both by light and electron microscopy.

In the Medical Sciences Building, Dr. Movat has continued his studies of the kinin system, to elucidate the sequence of interactions leading to the generation of kinin. He has also continued his investigation of the biologically active components of polymorphonuclear leukocytes and has found two anionic substances which enhance vascular permeability, as did the cationic substances found earlier.

Dr. Taichman has studied *in vivo* and *in vitro* the effect of soluble immune complexes on polymorphonuclear and mononuclear leukocytes, and has investigated the mechanism of action of the Forssman antibody. He is also working on the ultrastructural changes which occur in mast cells in the guinea pig.

Dr. Udaka continued his studies dealing with the observation of vasoactive substances from inflammatory lesions, mainly proteases and polypeptides. He also engaged in studies to try to ascertain the cellular source of the vasoactive agents.

Dr. Ranadive has continued his work on the enzymatic release of vasoactive factors from mast cells, and his study of antibodies to serotonin.

Dr. Fisher has established techniques for perfusing the isolated rat liver, and is beginning to study the metabolism of bile acids in collaboration with Dr. Kuksis of the Banting and Best Department of Research and Dr. Miyai.

In the Hospital for Sick Children, Dr. Conen has established microorgan cultures of childhood tumours, and is examining them by light and electron microscopy, and by enzyme histochemistry seeking evidence of viruses, or of differentiation into recognizable tissues, and to test the effects of certain chemotherapeutic agents and hormones. A scanning microspectrophotometer is being used to measure the DNA content of nuclei of irregular shape in tumours and leukaemia. Sections of teratomata in males and buccal smears from males with leukaemia are being studied to determine sex chromatin patterns. Fibroblast cultures are being examined to determine sex chromatin patterns. Fibroblast cultures are being examined for metachromasia, and their acid mucopolysaccharide content is being estimated chemically and by radiosulphate uptake in an attempt to distinguish the various mucopolysaccaridoses. In patients with idiopathic scoliosis, Dr. Conen is examining cultured fibroblasts to identify patients with a variant of Marfan's syndrome, is determining the incidence of sex chromatin positive cells to identify a variant of Turner's syndrome, and is studying the cultured cells by electron microscopy. Collagen and muscle removed from these patients at surgery will also be studied. In other investigations, chromosomal studies in males are in progress to determine the incidence of XXY patterns and of abnormalities in size or shape of the Y chromosome. The effect on chromosomes of therapeutic LSD given in another hospital is also being studied. Cultures of aminocentesis fluid are being used for antenatal karyotype determination. In addition, Dr. Conen is studying by electron microscopy lung biopsies taken before and after pump operations in children, calves, and dogs. The unusual tolerance of the calves and the vulnerability of the dogs is being related to differences in structure. The effect of anaesthetics on the ultrastructure of rabbit lung is also under study.

In St. Michael's Hospital, Dr. Ross with Dr. Sereny of the Department of Surgery has begun a study by light and electron microscopy of liver biopsies in glue-sniffers, and an investigation of the effects of inhaled toluene on the livers of rats. Dr. Medline is studying the effect of aldactone therapy on the zone glomerulosa of the adrenal gland, and is also investigating the "colloid bodies" of the corpus luteum of pregnancy.

Dr. Bell is continuing his study of the incidence of chromosomal abnormalities in newborn infants. Some 25 abnormalities have been found in the 23,000 specimens examined.

In addition, a number of reports of interesting cases have been prepared, often in collaboration with members of other departments.

Division of Neuropathology

With the assistance of Dr. H. Hugenholtz, Dr. Rewcastle has demonstrated by electron microscopy the cytomegalovirus present in an adult case of cytomegalovirus encephalitis.

Dr. H. Hugenholtz, has been studying the effects of trauma on the spinal cord, with emphasis on the attempt to create intramedullary cyst-like extensions above and below the sites of concussion. This has been a preliminary study in an attempt to make an experimental model akin to human post-traumatic progressive myelopathy.

With the assistance of Dr. Joe, Dr. Rewcastle has been completing his study on courses on induced myopathy in rabbits. In addition to the production of the acute myopathic process, an attempt has been made by repeated courses of steroid administration to produce a chronic myopathic process that would be similar to that occurring in the human. The problem has been the complication of infection in these animals. Recently we have carried out the same programme in hamsters, where it would appear that the problem of infection is not so great, but we have encoun-

tered the added problem of massive calcium deposition in the necrotic foci in the skeletal muscle fibres hindering the normal regenerative processes that occur following cessation of the therapy.

Dr. Rewcastle is completing his study of an adult case of Alexander's disease. He is studying the ultrastructure of a brain biopsy from a patient with Creutzfeldt-Jakob disease. Tissues from this patient (autopsy) were submitted to Dr. Gajdusek (National Institutes of Health, Bethesda) and have been inoculated into primates in an attempt to determine whether this subacute degenerative disorder of the nervous system is produced by a transferable agent.

Dr. Ball is continuing to study the "inclusion bodies" in Pick's disease by electron microscopy and other techniques. Dr. Armstrong has continued his work on the fine structure of abnormal muscle, and the investigation by immunofluorescent techniques of the structure of myosin filaments.

HONOURS

Dr. Ritchie was re-elected President of the Canadian Association of Pathologists, and elected President of the Seventh International Congress of Clinical Pathology, to be held in Montreal in July, 1969. Dr. Rewcastle is Chairman of the Section of Pathology of the Academy of Medicine, and continues as Secretary of the Canadian Association of Neuropathologists and as its representative to the International Society of Neuropathology. Dr. Lynch has been elected Chairman of the Section of Pathology of the Ontario Medical Association, and Dr. Ross Vice-President of the Ontario Association of Pathologists. Dr. D. W. Thompson is Chairman of the Canadian Society of Cytology. Dr. Bain was awarded the Society Award of the Canadian Society of Obstetricians and Gynaecologists. Dr. Movat was Chairman of the Third International Symposium on Cellular and Humoral Mechanisms in Anaphylaxis and Allergy.

SCHOLARLY ADDRESSES

W. Anderson, "The nature of tendon degeneration," International Congress of Veterinary Science, Guelph, Ontario.

R. M. Armstrong, "Nonprogressive myopathies of infancy and childhood," Winnipeg Children's Hospital.

J. S. Burke, "Phagocytosis of colloidal carbon in the rabbit spleen," Canadian Federation of Biological Societies, Edmonton.

J. S. Burke and G. T. Simon, "Phagocytosis of colloidal carbon in the rabbit spleen," Canadian Federation of Biological Societies, Edmonton.

K. Carstairs, "Autoimmune haemolytic anaemia," Ontario Antibody Club, Toronto.

P. E. Conen, "Sex chromatin studies in males with malignant disease," Ontario Association of Pathologists, Kingston.

——— "Myocardial infarction in a diabetic boy," Pediatric Pathology Club Annual Meeting, New Haven, Connecticut.

P. E. Conen, E. G. Murphy, and C. D. Bell, "Histopathological changes in nemaline myopathy," American Association of Pathologists and Bacteriologists, San Francisco.

J. H. Crookston, "Mechanisms of hemolysis," University of Mississippi Medical School, Jackson, Mississippi.

——— "Investigation of auto-immune hemolytic anemias, with special reference to transfusion therapy," University of Mississippi Medical School, Jackson, Mississippi.

——— "Hereditary erythroblastic multinuclearity with positive acidified serum test," University of Mississippi, Jackson, Mississippi and Duke University, Durham, North Carolina.

——— "Investigation of auto-immune hemolytic anemia," Mississippi State Society of Medical Technology, Jackson, Mississippi.

——— "Cold agglutinins, auto- and iso- ," Mississippi State Society of Medical Technology, Jackson, Mississippi.

——— "Compatibility testing," Mississippi State Society of Medical Technology, Jackson, Mississippi.

——— "Investigation of transfusion reactions," Mississippi State Society of Medical Technology, Jackson, Mississippi.

R. H. Curry and G. T. Simon, "A morphologic study of the pulmonary adenomatous tumour in mice," Ontario Association of Pathologists, Kingston, Ontario.

C. Ezrin, "The location of growth hormone and prolactin in the human pituitary," Workshop on Diabetes, Mount Gabriel.

——— "The pituitary confederation and the psyche," Montreal Clinical Society, Montreal.

——— (with G. Firestone and J. Bain), "Immunofluorescent localization and LH and TSH in the human pituitary gland," Royal College of Physicians and Surgeons of Canada, Vancouver.

——— (with J. Bain), "The identification of the LH-gonadotroph in the human adenohypophysis," Third International Congress of Endocrinology, Mexico City.

J. Hayes, "The toxic effect of intravenous halothane on the lungs of the experimental dog," American Association of Clinical Investigation, Boston.

K. Miyai, "Reversal by glucose of the nucleolar changes induced by ethionine," Federation of American Societies for Experimental Biology, Atlantic City, New Jersey.

H. Z. Movat, "Cellular and humoral mechanisms in anaphylaxis and allergy," Third International Symposium, Toronto.

D. Pantalony, "Automation in hematology," Ontario Society of Medical Technologists, Northern Group, Sudbury, Ont.

P. H. Pinkerton, "Hereditary iron deficiency in mice," XIIth Congress of the International Society of Haematology, New York City.

——— "Recent studies of pyrrole metabolism in thalassemia," Second Symposium on Problems of Cooley's Anemia, New York Academy of Sciences, New York City.

N. B. Rewcastle and L. Weyer, "Histochemical and electron microscopical features of Fabry's disease," Ontario Association of Laboratory Technicians, Toronto.

G. T. Simon, Y. Bedard and P. H. Pinkerton, "L'absorption du fer par la muqueuse duodénale. Etude au microscope électronique," Canadian Federation of Biological Societies, 12th Annual Meeting, Edmonton.

D. W. Thompson, "Experience with early detection in lung cancer," Cancer Symposium, Foothills Hospital, Calgary.

——— "Effects of smoking and preventative programmes," Centre for Continuing Education, Foothills Hospital, Calgary.

D. M. Young, "Service responsibilities of clinical chemists," American Association of Clinical Chemists and Canadian Society of Clinical Chemists, Washington, D.C.

——— "Health service delivery systems—analytical techniques," 5th Annual Convention, Ontario Society of Medical Technologists, Sudbury, Ontario.

——— "Approach to multiple clinical screening at Toronto General Hospital," Academy of Medicine, Lincoln County.

——— "Multiple screening procedures," Western New York Society of Pathology, Niagara Falls, New York.

——— "Multiple system chemical profiles," Niagara Falls Academy of Medicine, Niagara Falls, New York.

——— (with D. W. Penner and M. O. Klotz), "Research project of the Canadian Association of Pathologists. An outline with some results—their implications as to cost," American Society of Clinical Pathology, Miami.

PUBLICATIONS

ANDERSON, W. *et al.* "The Results of Radical Nephrectomy for Renal Cell Carcinoma" (*Journal of Urology*, vol. 101, March 1969, pp. 297–301).

BALL, M. J., and SILVER, M. D. "Influence of Age and Hypotension on Splenic Ligature Arteriolosclerosis" (*Canadian Medical Association Journal*, vol. 99, no. 25, Dec. 28, 1969, pp. 1239–45).

BELL, C. D., and CONEN, P. E. "Histopathological Changes in Duchenne Muscular Dystrophy" (*Journal of Neurological Sciences*, vol. 7, 1968, pp. 529–44).

BROWN, T. C. (with Fitzpatrick, P. J.) "Angiofollicular Lymph Node Hyperplasia" (*Canadian Medical Association Journal*, vol. 99, no. 25, Dec. 28, 1968, pp. 1259–62).

CARSTAIRS, K. "Drug-induced Immune Hemolysis" (*Proceedings of the Royal Society of Medicine*, vol. 61, no. 12, Dec. 1968, pp. 1309–11).

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CROOKSTON, J. H. "Transfusion Reactions" (*American Journal of Medical Technology*, vol. 34, no. 10, Oct. 1968, pp. 579–88).

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GARDNER, H. A., SIMON, G. T., and SILVER, M. D. "The Fine Structure of Rabbit Platelets fixed in Acetaldehyde" (*The Anatomical Record*, vol. 163, no. 4, April 1969, pp. 509–16).

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HARPER, T. A. *et al.* "Mobilisation of Iron in Pregnancy" (*Lancet*, vol. 2, Nov. 16, 1968, pp. 1055–8).

HAYES, J. A. *et al.* "Aortic Aneurysms in Jamaica" (*Transactions of the Royal Society of Tropical Medicine and Hygiene*, vol. 62, no. 4, April 1968, pp. 522–7).

——— "Induction of Atheroma in Cockerels as a Model for Studying Alterations in Blood Flow" (*Journal of Atherosclerosis Research*, vol. 9, 1969, pp. 47–56).

——— "Pulmonary Damage produced by Intravenous Administration of Halothane in Dogs" (*Clinical Research*, vol. 16, no. 4, Dec. 1968, p. 561).

KOLIN, A. *et al.* "Change of the Character and Course of Skin Inflammatory Reaction of Delayed Type Hypersensitivity in Guinea Pigs influenced by Preceding Systemic Administration of the Specific Antigen" (*Zeitschrift für Immunitätforschung*, vol. 136, no. 3, 1968, pp. 249–58).

KOLIN, A. (with Landi, S.) "The Effect of Actinomycin D on the Intensity of Tuberculin Skin Reaction in Guinea Pigs" (*Federation Proceedings*, vol. 28, no. 2, March–April, 1969, p. 564) (abstract).

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——— "Hemopoietic Progenitor Cells in Mice with X-linked Anemia" (*Proceedings of the XII Congress of the International Society of Haematology*, Aug. 1968, pp. 00–2) (abstract).
——— "The Metabolism of Haemoglobin Köln, an Unstable Haemoglobin" (*Nature*, vol. 219, no. 5153, Aug. 3, 1968, pp. 494–5).
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——— "The Myopathy of Hyperkalemic Periodic Paralysis" (*Archives of Neurology*, vol. 19, Sept. 1968, pp. 274–83).
——— "Myopathy of Hypokalemic Periodic Paralysis" (*ibid.*, vol. 20, June 1969, pp. 565–85).
——— "Spectrum of Rod Myopathies" (*ibid.*, vol. 18, May 1968, pp. 529–42).
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——— "Medial Hemorrhage and Dissection in a Coronary Artery: an Unusual Cause of Coronary Occlusion" (*ibid.*, no. 1, July 6, 1968, pp. 32–4).
——— "Intracardiac Knotting of a Transvenous Pacemaker" (*ibid.*, vol. 100, no. 12, March 22/29, 1969, pp. 581–2).
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PHARMACOLOGY

Under the direction of Professor W. Kalow

Staff and students of the Department of Pharmacology took part in the probing and soul-searching which went on in the University and in the Faculty during the past year. In addition, pharmacologists had to cope—perhaps more than in previous years—with questions from the community at large. There were requests to talk to school and church groups about centrally active drugs. The acute public interest in toxic chemicals led to studies and comments. Thus, at a time of challenge, members of the staff served the community as knowledgeable individuals.

The setting of the Department changed during the year because of the move into the new Medical Sciences Building. This brought a gratifying gain of some space and good accommodation. However, the main advantage of the move was in the consolidation of the Department, which during the past few years was scattered over four different buildings. Being again a neighbour of other basic medical science departments stimulated contact and exchange of ideas. This is increasingly important since the professional interests and scope of the department ranged from molecular pharmacology to clinical pharmacology, and thus covered a remarkably wide range.

Members of this Department, as well as their colleagues from other depart-

ments, are preparing for the New Curriculum for the teaching of undergraduate medical students. Yet during the year covered by this report, teaching activities were similar to those of previous years with perhaps one exception. In preparation for the increased use of specialist-teachers in the New Curriculum, the formal lectures to second-year medical students were divided among a larger number of lecturers than before so that a total of fourteen teachers participated. The course to students of dentistry was organized and conducted by Professor F. A. Sunahara, that to students of Pharmacy by Professor M. A. Kumar.

During the year the following personnel changes took place: Professor E. A. Sellers resigned his appointment as Associate Dean of the Faculty as of June 30, 1968, and since that time has devoted correspondingly greater time to research and departmental duties. However, he still remains Curriculum Co-ordinator of Period I and is Chairman of the Research Equipment Committee of the Faculty.

In the course of the year, the Department welcomed three new members. Professor Oleh Hornykiewicz, the discoverer of a dopamine deficiency in Parkinsonism, had spent a year as a visiting professor from Vienna, and decided to accept the invitation to join the staff of this Department. He is also appointed to the Clarke Institute of Psychiatry. Professor Jaime Talesnik, a professor and well-known textbook author from the University of Chile, accepted the cordial offer to join this Department after a year as visiting professor. Towards the end of the year, Dr. L. Spero was welcomed as a member of this Department in the capacity of Assistant Professor. Dr. Spero was trained in Cambridge and New York.

The summer student programme is still growing. Increased University and Extramural support is gratefully acknowledged. Extramural support: Burroughs Wellcome and Company (Canada) Ltd., CIBA Company Limited, and Geigy (Canada) Ltd.

Graduate students have completed the following theses for the PH.D. degree: Reuben Baumal, "Studies into the Occurrence of Soluble Antigen-Antibody Complexes in Disease"; James Duffin, "A Model of the Respiratory System"; Dezso Kadar, "Effect of Prostaglandin on Isolated Vascular Tissue"; W. J. Russell Taylor, "Chemostimulation to Respiration"; and for the M.SC. degree: Abraham Chaiton, "Ion Transport and ATPase Activity"; Harvey J. Freedman, "Investigations into the Mechanism and the Pharmacological Modification of Protease-Induced Hypotension in the Dog"; Suksawat Pensuwan, "Effect of Calcitonin on Normal and Abnormal Bone"; Phyllis E. Powell, "Histidine Decarboxylase Activity in the Stomach Mucosa."

Among the many visitors to the Department of Pharmacology were Professor S. Lissitsky, Laboratoire de Biochimie Médicale, Faculté de Médecine et de Pharmacie de Marseille, France (French-Canadian Exchange Programme); Professor Herschel Jick, Director of Clinical Pharmacology, Lemuel Shattuck Hospital, Boston, Mass.; Professor John A. Oates, Department of Pharmacology, Vanderbilt University, Nashville, Tenn.; Dr. J. Metcalfe, The Molecular Pharmacology Research Unit, Cambridge University, England; Professor Gabriel Plaa, Department of Pharmacology, University of Montreal; Dr. David Quastel, Faculty of Medicine, Dalhousie University; Professor M. Wurzel, Department of Physiology, University of Ottawa; Dr. Alexander T. Shulgin, Langley Porter Neuropsychiatric Research Institute, San Francisco Medical Center, San Francisco, California; and Dr. R. Mechoulam, Hebrew University, Jerusalem.

RESEARCH

In Professor Kalow's section, Dr. Beverly A. Britt continued to investigate malignant hyperthermia, a rare but serious complication of anaesthesia. These studies proved hereditary predisposition of affected persons. Emphasized at present are *in vitro* pharmacological and biochemical studies on human skeletal muscle. Dr. J. Brebner continued with the purification and isolation of human lung esterases, and compared them with enzymes of other tissues. Definition of interactions between particular

esterases and drugs was begun. In collaboration with Dr. Seeman, Mr. David Bailey investigated the ionization of chlorpromazine, and is studying the role of ionization in determining the entrance of the drug into cell membranes.

Professors E. A. Sellers and E. Schönbaum have continued to collaborate with the Toronto Thyroid Group. The sera of more than 500 patients suffering from diseases of the thyroid have been assayed for thyroid stimulating hormone (TSH) or the long-acting thyroid stimulator (LATS). These results are now being related to other laboratory and clinical findings. Miss Gail Pirie has continued her studies on the experimental production of LATS in rabbits, testing the hypothesis that this substance is an antibody. Dr. J. van Maanen, a graduate of the University of Utrecht, is spending a year in the Department and is studying binding of thyroxine to plasma proteins. He is particularly interested in the binding of thyroxine to thyroglobulin antibodies. Mr. Frank Pallares studied immune thyroiditis in rats and showed that the degree of thyroiditis produced was affected by hyper- or hypo-thyroidism. Mrs. M.-L. D. Schönbaum has been using a thyroid tissue incubation system to study the action of thyroid stimulating hormone. Her work supports the hypothesis that TSH acts by increasing the level of 3′5′-cyclic AMP in the thyroid cell.

Doctors E. Schönbaum and G. Steiner (Department of Medicine) have continued experiments on the role of brown fat in acclimation to cold, and have collaborated with Dr. D. M. Derry in part of this study.

In the addiction research group, under the direction of Professor H. Kalant, a number of studies have been completed in relation to central nervous system tolerance and, in experiments jointly supervised by Professor J. M. Khanna, to the interaction between alcohol and other drugs. Mr. G. Bustos has examined hepatic lipid turnover in the livers of animals chronically treated with alcohol, after various periods of alcohol withdrawal. With the generous help of Professor J. Ogilvie (Department of Mathematics), he has set up a computer model to analyse the results, and is currently evaluating it. Dr. Khanna has completed a study of liver pyridine nucleotide ratios and lactate/pyruvate ratios after an alcohol dose in animals previously on chronic alcohol treatment. Such animals were found to show a reduced sleeping time after a standard dose of barbiturate. To explore this phenomenon, a measurement of barbiturate concentrations in blood and brain by gap–lipid chromatography has been perfected. The uptake of barbiturate *in vitro* by liver slices from normal rats and others treated chronically with phenobarbital or with alcohol has been examined and it was found that phenobarbital pretreatment increased this uptake, but alcohol did not. In parallel experiments, it has been shown that alcohol is not metabolized *in vitro* by the liver microsomal barbiturate-metabolizing system, despite recent claims that it is. The blood alcohol disappearance curve *in vivo* in rats is not affected by treatments which increase or inhibit metabolism of barbiturates, and alcohol sleeping times are similarly unaffected. A similar experiment in mice is in progress.

Nervous system tolerance to alcohol has been studied in great detail by Mr. A. E. LeBlanc. When rats were given alternating periods of daily alcohol treatment and alcohol-free recovery, tolerance to the alcohol was re-evoked more rapidly on each successive cycle, indicating an increasing residual carryover effect. In addition, training on the performance test while under the effects of alcohol resulted in a more rapid acquisition of tolerance, as expected, but this "learning effect" proved to be indistinguishable from true physiological tolerance, and also gave rise to signs of physical dependence. In separate experiments, chlordiazepoxide has been found to interact in a complex fashion with alcohol: low doses antagonize the alcohol effect while higher doses enhance it. In collaboration with Doctors R. J. Gibbins and C. D. Webster of the Addiction Research Foundation, Dr. M. D. Willinsky has been developing behavioural tests suitable for quantitative study of the effects of moderate doses of cannabis in animals and other behavioural measures suitable for examining the development of tolerance to alcohol have been tested.

Studies of brain chemistry in relation to drug tolerance have also progressed.

The effects of pentobarbital and alcohol on the release of acetylcholine from brain cortex slices during electrical stimulation *in vitro* have been compared. Currently microchemical methods of assaying acetylcholine in such preparations are being tested. Synaptosomes and synaptic vesicles from guinea-pig brain have been successfully isolated by a new electrophoretic method, and the chemical and enzymatic properties of these fractions are now being studied. Dr. Willinsky is developing a very sensitive gas chromatographic method for assaying cannabis ingredients in brain and blood after administration to animals. Studies of the effects of various cations, and of freezing and thawing, on the activity of sodium–potassium-stimulated ATPase of rat brain and on the effect of alcohols upon it have been extended.

Professor E. Llewellyn Thomas has continued his research, and his activities will be included in the report of the Institute of Bio-Medical Electronics.

In Professor P. D. Cooper's laboratory, subjects of continuing investigation are stereochemical factors which influence hallucinogenic and cholinergic drug-receptor interactions. A study of the effects of enzymes on nicotinic receptors in skeletal muscle was also completed.

During the past year in Professor D. M. Derry's section, investigations have been initiated on the function of brown adipose tissue. A method has been developed for staining the catecholamines in sympathetic nerve fibres. With this method, anatomical, physiological, and pharmacological studies have been started in rats, mice, pigs, and rabbits. Dr. Derry has found that the basic anatomical difference between brown adipose tissue and white adipose tissue is in the sympathetic innervation of the parenchymal cells. The physiological experiments involve the response of brown fat and the sympathetic nerve fibres under conditions of cold stress and starvation. Work is now underway to study the effects of lipid mobilizing drugs upon the catecholamine and lipid content of the brown adipose tissue. In collaboration with Dr. G. Steiner (Department of Medicine) and Dr. E. Schönbaum it has been found that brown adipose tissue has two sympathetic nerve supplies coming from different origins. Since there are two sympathetic nerve supplies to brown fat, it is suggested that, under different circumstances, brown fat can respond differently and perhaps have more than one function.

Under the direction of Dr. L. Endrenyi, computer studies on the quantitative analysis of unresolved Gaussian contours were extended to peaks having unequal widths. It was shown that estimation of the components by the frequently used integration methods (following drop-line or tangential separation of the peaks) are extremely biased. Triangulation routines are more reliable, while comparisons of certain ordinates provide still better measures of the relative component peak sizes. Further methods of evaluation yielding improved accuracies have been proposed. A study of discrimination between alternative kinetic models was initiated. In particular, tests for the validity of hyperbolic kinetic relationships have been investigated. These include the Michaelis-Menten equation of enzyme kinetics and the analogous, but not equivalent, relationship utilized for the study of protein binding of drugs. In both cases the powers of various linearizing methods have been compared under different simulated experimental conditions and the most powerful discriminators have been selected.

Research under Professor C. H. Hockman deals with central nervous system mechanisms which play a role in the regulation and/or modulation of autonomic function. With Doctors J. Talesnik and K. E. Livingston it has been shown, in adult cats, that reflex vagal bradycardia elicited by electrical stimulation of the carotid sinus nerve was either augmented or inhibited by simultaneous electrical stimulation of the same neural locus in the central gray substance of the mesencephalon, the hippocampus, and the amygdaloid complex. These modulatory influences were unaffected by a high cervical spinal transection, but were completely abolished by a decerebration which left the hypothalamus intact. The results suggest that limbic forebrain structures can exert modulatory influences on the brainstem baroceptor reflex. In another series of experiments (with Doctors Talesnik, Livingston, and

Mr. A. E. LeBlanc) the effects of alcohol on the centrifugal influences on the baroceptor reflex were assessed. Preliminary results indicate that ethanol inhibits the central modulatory influences on the baroceptor reflex and alters the sensitivity of the carotid sinus nerve by augmenting the reflex response to electrical stimulation of this nerve. Studies on the effects of psychotropic drugs on cortically evoked responses are in progress. Acoustic stimuli are delivered to human subjects before and following administration of psychotropic agents. The stimulus configuration is such that the subject, under certain experimental conditions, must make and record a guess related to the forthcoming stimulus. Preliminary data indicate that ethanol and pentobarbital administered at low doses depress all components of the evoked response, including the components related to the stimulus configuration.

In the section of Psychopharmacology, under the direction of Dr. O. Hornykiewicz, research activities were somewhat limited by the fact that the section was still in the process of being set up and getting organized. In spite of these limitations, two research projects have been started: (1) The action of L-Dopa on the locomotor activity (in mice) in relation to the regional distribution of L-Dopa and its metabolites (L-methoxydopa, dopamine, methoxydopamine and noradrenaline). Included in this study is an examination of the potentiating action of peripheral dopa decarboxylase inhibitors on the central pharmacological effects of L-Dopa. The aim of the study is to provide a better understanding of the pharmacological and chemical mechanisms by which L-Dopa exerts its beneficial effect on the extrapyramidal symptoms in parkinsonian patients. (2) Action of neuroleptic drugs (phenothiazine derivatives) on the dopamine metabolism in the caudate nucleus (in rabbits) in relation to the extrapyramidal potency of these compounds. In these studies, oxotremorine is being used as a pharmacological tool, and the aim is to elucidate the mechanism by which neuroleptic drugs interfere with the dopamine metabolism in the extrapyramidal brain centres; this should eventually result in a better understanding of the extrapyramidal side-effects of antipsychotic drugs.

During Professor G. E. Johnson's sabbatical leave in Switzerland, his laboratory was supervised by Dr. K. V. Flattery. Research was continued to determine the role played by the catecholamines in the maintenance of normothermia during cold exposure. Accompanying this were studies of the effects of drugs on the activity of the sympathetic nervous system during exposure to 4° C and 27° C. The effects of ganglionic blockade were studied by administering the drug mecamylamine, and measurements of the excretion rate of catecholamines and their major metabolites showed a reduction in synthesis as well as release of noradrenaline. Experiments conducted to study the effects of cold exposure on the synthesis and secretion of noradrenaline in rats treated with nerve growth factor antiserum confirmed previous reports that secretion in the antiserum-treated rats was similar to that of normal intact rats. However, synthesis and the rate of metabolism of noradrenaline in the antiserum-treated animals were considerably lower. Studies have been initiated to determine if an inhibition of synthesis of noradrenaline by the drug alphamethyl-p-tyrosine alters the formation and binding of the false neurotransmitter metaraminol from its precursor alphamethyl-m-tyrosine.

Professor M. A. Kumar, with Dr. W. C. Sturtridge, has continued the research on human plasma calcitonin and on experimental calcitonin deficiency. The relation of plasma calcitonin to human osteoporosis and osteopetrosis is under active study. Chronic calcitonin deficiency impairs bone development in 1–2 month old growing rats but has little effect in one-year-old animals. Further work on the relation of the hormone to calcification of bone is in progress.

The research activities of Professor W. A. Mahon will be reported by the Department of Medicine.

Under the direction of Professor W. H. E. Roschlau, the following research has been conducted: (1) The activation by proteolytic enzymes of vasodepressor plasma kinins, of which the most well-known active agent is bradykinin, has become a recognized side effect of thrombolytic therapy. In order to identify clinically useful

antidotes for specific side effects of thrombolytic enzymes, a study was made of the possible mechanisms of kinin activation, and their prevention or modification by standard drugs. Using the dog as experimental subject, and the enzyme Brinase (CA-7) as a model drug, cardiovascular effects of "thrombolytic" doses were analysed. Then kinin-indured vasomotor collapse was induced with "lethal" doses of the enzyme, and possible blocking agents or antagonists were examined. The beta-adrenergic blocking agent propranolol was shown to modify typical blood pressure responses to Brinase overdose, allowing the survival of "lethal" doses of the enzyme. Metaraminol bitartrate, a predominantly alpha-adrenergic stimulant, succeeded in raising blood pressure to normotensive values for several hours after Brinase hypotension was induced, thus overcoming acute circulatory deficiencies until spontaneous restoration of blood pressure occurred. The results of this study allow a more confident approach to systemic fibrinolytic therapy by identifying suitable antidotes in conditions of excessive secondary kininogenesis. (2) An assay was developed to measure and display the rate of fibrinolysis by thrombolytic enzymes on a fibrin suspension substrate. Using photometric (turbidometric) techniques and chart recordings, the assay allows rate comparison of different enzymes as well as the detection and measurement of enzyme inhibitors and potentiators.

Professor P. Seeman's section is concerned with the structure and function of the cell membrane, and during the last year the following progress has been made: (1) The partition theory of anaesthesia, first proposed by Meyer and Overton in 1899 and 1901, has been directly confirmed. These early workers predicted that the concentration of any anaesthetic inside the site of action (nerve membrane) should always be around 0.05 moles of drug per litre of solid membrane. This prediction is correct. (2) With Dr. W. Kwant and Mr. S. Roth, it has been discovered that the bond existing between an alcohol molecule (or a tranquillizer molecule) and the membrane is a hydrophobic bond. (3) New and sensitive methods have been worked out for measuring the areas of red cell membranes and for slight changes in these areas brought about by drugs. All anaesthetics were found to expand the cell membrane area. (4) The technique of freeze-fracture electron microscopy is being developed. (5) It was discovered that anaesthetics and tranquillizers exert their membrane action by removing calcium ions from the cell membrane.

In Professor A. K. Sen's section, Dr. T. Tobin's studies on the mechanism of inhibition of the transport enzyme (Na/K)-ATPase by the cardiac glycoside, ouabain, are nearing completion, and it has been concluded that there are at least two major conformations of this enzyme—one in communication with the intracellular (E_i) and the other with the extracellular media (E_o). These two conformations alternate during the ion movements. Ouabain could bind to the enzyme only when it was in E_o form. Experiments using ^{3}H-ouabain gave further insight to the reaction mechanism of this inhibitor. In collaboration with Dr. C. C. Liew (Department of Pathological Chemistry) some preliminary experiments have been carried out to study the effect of aldosterone on the (Na/K)-ATPase synthesis. A definite correlation between enzyme activity and stimulation of its synthesis by aldosterone, as claimed by other workers, could not be established. Further experiments are in progress to elucidate the mechanism of action of aldosterone on the transport system. The effect of the thiol-reacting diuretic, ethacrynic acid, on the transport enzyme is being studied and a comparison is simultaneously being made with a thiol-reacting non-diuretic N-ethylmaleimide. Experiments so far indicate that two —SH groups are involved in the active sites of this enzyme if it is assumed that both the drugs reacted with —SH groups only. Satisfactory progress has been made in a study on enzyme solubilization and purification.

The investigation into the mechanism of prostaglandins in the vascular system has been continued in Professor F. A. Sunahara's laboratory. In collaboration with Doctors M. Viguera and D. Kadar a microscope-image splitting eyepiece-TV-recording system was developed which made it possible to monitor and record changes in the circocirculation of various vascular beds. Although this technique was developed

for investigating prostaglandin–catecholamine interaction, it is also being used for studying other vasoactive pharmacological agents on the microcirculation. Moreover, the TV tape produced from this work is being employed in graduate and undergraduate teaching programmes. It was demonstrated that prostaglandin E_1 (PGE_1) inhibited the effects of catecholamine but not of angiotensin II. PGF_2, on the other hand, did not modify the catecholamine effect. In another series, detailed studies of prostaglandin effect *in vitro* on isolated vascular tissues were carried out. It was shown that PGE_1 and $PGF_1\alpha$ effects on isolated superior mesenteric strips of veins and arteries are inhibited by pretreatment of tissue with ouabain. The effects of electric stimulation of the perfused central artery of the rabbit ear were inhibited by PGE_1 and this inhibition was abolished by pretreatment with ouabain. These experiments confirmed that PGE_1 and $PGF_1\alpha$ activity requires the presence of membrane $(Na^+ + K^+)$-dependent ATPase. $PGF_2\alpha$ effect, on the other hand, is not dependent on this enzyme. These studies are being continued.

In Professor T. T. Zsoter's section, the study on the effect of hydrochlorothiazide and related diuretics on the venous system continued. The interaction of prolonged administration of these diuretics with vasoactive drugs is being investigated, and from this study it is hoped to improve knowledge of how thiazides decrease blood pressure. Studies of the action of hypoxia on the effect of vasoactive drugs have been completed and the effect of hypercapnia on the response to various vasoactive drugs is presently under investigation. In the Toronto Western Hospital, studies include: (with Dr. J. R. Beck) the effect of various drugs on venomotor reflexes, and the effect of beta adrenergic receptor stimulation in forearm veins; (with Dr. Nadasdi) the effect of meperidine on the peripheral circulation; (with Dr. Beanlands) the effect of propanolol in angina pectoris. A new hypotensive drug, Catapres, is presently being evaluated in a double blind study.

HONOURS

Dr. W. H. E. Roschlau, the Honors Achievement Award from the Angiology Research Foundation, New York, U.S.A., in recognition of distinguished contributions and significant accomplishments in the support of research and study of angiology.

Dr. P. D. Cooper, Government of France Visiting Scientist, April–May, 1968.

SCHOLARLY ADDRESSES

Dr. P. D. Cooper, "Effects of Enzymes on Isolated Tissues" at the Centre National de la Recherche Scientifique, Paris, France.

Dr. L. Endrenyi, "Tests for the Validity of the Michaelis-Menten Equation of Enzyme Kinetics" at the American Chemical Society 156th National Meeting, Atlantic City, N.J.; "Overlapping Gaussian Peaks of Unequal Widths: Accuracies of Measurements" at the Chemical Institute of Canada, 52nd Annual Conference, Montreal, P.Q.

Dr. C. H. Hockman, "Central Nervous System Modulations of Cardiovascular Reflexes," Hoffmann-La Roche, Inc., Nutley, N.J.; "Supramedullary Modulation of Autonomic Reflexes," Brain Research Symposium, Massey College, University of Toronto; "Central Modulation of Autonomic Activity: Implications for Limbic-Forebrain Concepts of Emotion and Behaviour" (with Dr. K. E. Livingston), Meeting of the American Association of Neurological Surgeons, Cleveland, Ohio.

Dr. O. Hornykiewicz, "Differential Action of Chlorpromazine on the Dopamine Metabolism in the Substantia Nigra and the Striatum" at the Research Conference on Biogenic Amines, University of Ottawa; "Dopamine Metabolism in Human Brain Under Normal and Pathological Conditions," Pfizer Lecture 1968, Clinical Research Institute of Montreal; "Brain Dopamine and Parkinsonism" to the U.S.A. Neuroscience Group at the Woodruff Medical Center of Emory Univer-

sity, Atlanta, Georgia; "Neurochemistry and Pharmacology of Parkinsonism" at Abbott Laboratories, Scientific Divisions, North Chicago, Ill.; "Brain Amines and Basal Ganglia Diseases" to the Department of Pharmacology, University of Chicago.

Dr. H. Kalant, "Relations between Alcoholism and Drug Addictions: The Research View" at plenary session of the 28th International Congress on Alcohol and Alcoholism, Washington, D.C.

Dr. W. Kalow, "New Aspects of Pharmacogenetics," Special University Lecture in Pharmacology at the University of London, London, England; "Advances in Pharmacogenetics" before the Midwest Committee on Drug Investigation, University of Chicago; "Heredity and the Response to Drugs" at the American Academy of Dermatology meeting in Chicago; "Advances in Pharmacogenetics" at the 7th Annual Meeting of the American College of Neuropsychopharmacology, San Juan, Puerto Rico; "Basic Principles of Pharmacogenetics" at the 6th Annual Postgraduate Seminar in Anesthesiology, University of Miami, Florida; "Enzyme Induction—its Effect on Drugs" at the Graduate Meeting sponsored by the Medical Alumni Association, University of Toronto; "Pharmacogenetics" at a Symposium on Pharmacogenetics held at the Royal Society of Medicine, London, England; "Genetic Variability of Enzymes" presented at the Biennial Western Conference on Anesthesiology, Salt Lake City, Utah; "Pharmacogenetics" at a combined meeting of the Departments of Anesthesia and Pharmacology, Northwestern University, Chicago; "The Influence of Genetic Factors in Drug Action" presented at The Symposium "Physiological Equivalence of Drug Dosage Forms" held by the Food and Drug Directorate, Ottawa.

Dr. M. Ashwini Kumar, "Role of Calcitonin in Calcium Metabolism" at the 20th Meeting of the American Association of Clinical Chemists, Washington, D.C.

Dr. W. H. E. Roschlau, "CA-7 Connaught (fibrinolytic enzyme from Aspergillus oryzae)—Observations on its Pharmacology, Toxicity and Clinical Applications" at Ayerst Laboratories, Montreal.

Dr. P. Seeman, "Membrane Expansion and Stabilization by Drugs" at the First International Symposium on Membrane Permeability and Metabolism of Erythrocytes and Thrombocytes, Vienna.

Dr. E. A. Sellers, "Trends in Medical Education" to the students and staff of the Faculty of Medicine, University of Western Ontario; "Changes in Medical Undergraduate Education" at the Spring Meeting of the Pharmaceutical Manufacturers Association of Canada in Toronto.

Dr. W. C. Sturtridge, "Hypocalcaemic Activity in Human Plasma" at the 3rd International Congress of Endocrinology, Mexico.

Dr. F. A. Sunahara, "Use and Abuse of Premedication" to the inaugural meeting of the Paedodontic Society Club of Toronto; "Pharmacological Research in Universities" at the Spring Meeting of the Pharmaceutical Manufacturers Association of Canada.

Dr. T. T. Zsoter, "Propanolol in Angina Pectoris" at the Annual Meeting of the Royal College of Physicians and Surgeons, Vancouver, B.C.

PUBLICATIONS

Banerjee, S. P., and Sen, A. K. "On the Mechanism of Inhibition of (Na + K)-ATPase by N-Ethylmadeimide and Ethacrynic Acid" (*Federation Proceedings*, vol. 28, no. 2, March–April 1969, p. 589) (abstract).

Britt, B. A., and Kalow, W. "Hyperrigidity and Hyperthermia Associated with Anesthesia" (*Annals of the New York Academy of Sciences*, vol. 151, Art. 2, July 31, 1968, pp. 947–58).

Chan, W. C., and Johnson, G. E. "Influence of Cold Exposure on Catecholamine Depleting Actions of Hydroxylase Inhibitors" (*European Journal of Pharmacology*, vol. 3, no. 1, April 1968, pp. 40–6).

Chan, M. S., and Endrenyi, L. "Protein Binding of Drugs: Tests for the Equivalence and

Independence of Binding Sites" (*Federation Proceedings*, vol. 28, no. 2, March–April 1969, 613) (abstract).

Chan, A. M., Lynch, M. J., Ezrin, C., Bailey, J. D., Schönbaum, E., and Fraser, D. "The Thyroid in Cystinosis" (*Annals of the Royal College of Physicians and Surgeons of Canada*, vol. 1, no. 1, Jan. 1968, p. 53).

Derry, D. M., and Schönbaum, E. "A Simplied Method for Demonstrating Sympathetic Nerves in Various Tissues including Brown Fat" (*Proceedings Canadian Federation of Biological Societies*, vol. 11, 1968, p. 43).

Derry, D. M., Schönbaum, E., and Steiner, G. "Two Sympathetic Nerve Supplies to Brown Adipose Tissue of the Rat" (*Canadian Journal of Physiology and Pharmacology*, vol. 47, no. 1, Jan. 1969, pp. 57–63).

Flattery, K. V., Shum, A., and Johnson, G. E. "The Influence of Orally Administered Prenylamine on the Storage and Excretion of Catecholamines in Humans and Rats" (*Archives internationales de Pharmacodynamie et de Thérapie*, vol. 175, no. 1, sept. 1968, pp. 54–62).

Hockman, C. H., Talesnick, J., and Livingston, K. E. "Central Nervous System Modulation of Cardiovascular Reflexes" (*Proceedings International Union of Physiological Sciences*, XXIV International Congress, vol. 7, August 1968, p. 196).

Hockman, C. H., and Livingston, K. E. "Cerebellar Modulation of the Cardio-Inhibitory Reflex" (*Federation Proceedings*, vol. 28, no. 2, March–April 1969, p. 714) (abstract).

Johnson, G. E., and Pugsley, T. A. "The Formation and Release of Metaraminol during Exposure to Warm or Cold Environments" (*British Journal of Pharmacology and Chemotherapy*, vol. 34, no. 2, Oct. 1968, pp. 267–76).

Kalant, H. "Alcohol, Pancreatic Secretion and Pancreatitis" (*Gastroenterology*, vol. 56, no. 2, Feb. 1969, pp. 380–5).

Kalant, H., and Hickie, R. A. "Effects of Divalent Cations on K^+ Transport in Rat Liver and Morris Hepatoma 5123tc" (*Cancer Research*, vol. 28, no. 10, Oct. 1968, pp. 2086–91).

Kalow, W. "Pharmacogenetics in Animals and Man" (*Annals of the New York Academy of Sciences*, vol. 151, Art. 2, July 31, 1968, pp. 694–8).

——— "Susceptibility to Drug Action" in *Genetics in Medical Practice*, ed. M. Bartelos, pp. 219–29. Philadelphia: J. B. Lippincott, 1968.

Kumar, M. A. "Role of Calcitonin in Calcium Metabolism" (*Clinical Chemistry*, vol. 14, no. 8, Aug. 1968, pp. 814–15).

Kwant, W. O., Roth, S., and Seeman, P. "The Binding of Chlorpromazine and Alcohol Anesthetics to Membranes" (*Federation Proceedings*, vol. 28, no. 2, March–April 1969, p. 614) (abstract).

LeBlanc, A. E. "Microdetermination of Alcohol in Blood by Gas-Liquid Chromatography" (*Canadian Journal of Physiology and Pharmacology*, vol. 46, no. 4, July 1968, pp. 665–7).

Liew, C. C., and Sen, A. K. "Effect of Aldosterone on Protein Synthesis and (Na + K)-stimulated ATPase Activity" (*Proceedings International Congress of Physiology*, vol. 7, 1968, p. 264) (abstract).

Pugsley, T. A., and Johnson, G. E. "Modified Method for the Estimation of Metaraminol and α-methyl-m-tyramine" (*Journal of Pharmacy and Pharmacology*, vol. 20, no. 6, June 1968, pp. 490–1).

Radomski, M., Britton, A., and Schönbaum, E. "A Free Fatty Acid-Free Thyroxine Relationship in Serum" (*Canadian Journal of Physiology and Pharmacology*, vol. 46, no. 1, May 1968, pp. 119–20).

Roschlau, W. H. E., Freedman, H. J., and Miller, S. L. "Pharmacological Modification of the Vascular Response to Systemically Administered Thrombolytic Enzymes (CA-7)" (*Canadian Journal of Physiology and Pharmacology*, vol. 47, no. 4, April 1969, pp. 369–76).

Seeman, P. "Membrane Expansion and Stabilization by Drugs"; in *First International Symposium on Membrane Permeability*, ed. E. Deutsch, E. Gerlach, and K. Moser, pp. 384–91. Vienna: Springer-Verlag, 1969.

Shum, A., Johnson, G. E., and Flattery, K. V. "Influence of Ambient Temperature on Excretion of Catecholamines and Metabolites" (*American Journal of Physiology*, vol. 216, no. 5, May 1969, pp. 1164–9).

Sunahara, F. A., and Kadar, D. "Effects of Ouabain on the Interaction of Autonomic Drugs and Prostaglandins on Isolated Vascular Tissue"; in *Prostaglandin Symposium of the Worcester Foundation for Experimental Biology*, ed. P. W. Ramwell and J. Shaw, pp. 247–57. New York: John Wiley and Sons, 1968.

Sturtridge, W. C., and Kumar, M. A. "Hypocalcemic Activity in Human Plasma"; in *Excerpta Medica International Congress Series*, vol. 157, 1968, p. 8) (abstract).

——— "An Improved Bioassay for Calcitonin" (*Journal of Endocrinology*, vol. 42, no. 4, Dec. 1968, pp. 501–3).

Walters, G. C., and Cooper, P. D. "An Alicyclic Analog of Mescaline" (*Nature*, vol. 218, no. 5138, April 20, 1968, pp. 298–300).

PHYSIOLOGY

Under the direction of Professor R. E. Haist

The Department has had an active year in teaching and research. Approximately 2,256 students were taught in the various courses given, 863 of these in laboratory classes. The number of graduate students has increased to 42. Of these 18 were proceeding to the PH.D. degree. A graduate course in tracer methodology was introduced this year and a graduate course in cardiovascular physiology was planned.

The department was pleased to welcome two new members during this year, Dr. John Grayson, Professor, formerly Head of the Department of Physiology at Ibadan, Nigeria, whose interest is cardiovascular and environmental physiology, and who has strengthened our cardiovascular section, and Dr. Roy Macfarlane Preshaw, Associate Professor, an outstanding young gastrointestinal physiologist, who has started a section of gastrointestinal physiology, a field greatly in need of development in Canada.

Many distinguished scientists visited the department. The following gave lectures or seminars: Dr. W. Malaisse,* University of Brussels, Belgium; Dr. R. F. Mottram,* University College of South Wales and Monmouthshire, Britain; Dr. J. J. Dreifuss,* University of Geneva, Switzerland; Dr. F. M. S. Chang,* McGill University; Dr. D. H. Copp, University of British Columbia; Dr. R. Nadeau,* University of Montreal; Dr. E. Monod,* University of Paris, France; Dr. K. Thurau,* University of Munich, Germany; Dr. A. Naimark,* University of Manitoba; Dr. P. Sonksen,* Joslin Research Laboratory, Harvard Medical School.

Nine of these lectures* were given under the Visiting Lecturers Programme of the School of Graduate Studies. In addition, special lectures were given by: Mr. C. R. Cowan, Dr. R. L. Macmillan and Dr. F. C. Monkhouse, the Banting and Best Department of Medical Research, the Department of Medicine and the Department of Physiology, University of Toronto; Dr. J. Kryspin, Institute of Biomedical Electronics and the Department of Physiology, University of Toronto.

The Department is indebted to a number of honorary members who assisted in undergraduate and graduate teaching: Dr. Stanley Hartroft; Dr. Donald Fraser; Dr. Julio Martin; Dr. Langford Kidd; Dr. Flavio Coceani; Dr. S. W. Kooh; Dr. L. Sutherland; and Dr. R. Wilson of the Research Institute, Hospital for Sick Children; Dr. Walter Johnson of the Department of Otolaryngology; Dr. A. T. Storey of the Faculty of Dentistry; Dr. R. J. Shephard of the School of Hygiene; and Dr. J. Blumenstein, Mount Sinai Hospital.

Dr. B. Schofield, Visiting Professor for six months, assisted in teaching and has been especially concerned with development of visual aids, particularly 8-mm films, and their possible use in the New Curriculum. Dr. J. Hunter was responsible, in collaboration with several other members of the department and the Experimental Education Division of the School of Practical Science, for the production of several videotapes for use in the New Curriculum.

One very important event during this year was the move to the new Medical Sciences Building. This took place gradually from September to May. As laboratories in the new building were completed more members of the department moved in. The new facilities promise to be excellent. Despite the disruption caused by moving, the research activity has been high. An outline of the various projects follows.

RESEARCH

In Professor R. E. Haist's section Mrs. J. Coddling and Mrs. M. Merrilees have been investigating the effect of serum and acid-alcohol-treated serum on the action of insulin on glycogen synthesis in muscle, as well as the influence of extracts of the submaxillary gland on this activity. Professor M. A. Ashworth and Mrs. D. Craik have been developing a method for islet volume estimation which can be used in

large animals. Dr. B. J. Lin and Miss W. Asico have collaborated with a number of groups in a study of factors influencing the level of blood insulin. With Professor A. M. Rappaport quantitative measurements of insulin secretion in an isolated pancreatic remnant have been carried out and the effects of adrenaline and of changes in blood flow investigated. Dr. M. Vigas, a Visiting Scientist from Bratislava, Czechoslovakia, on an MRC fellowship, collaborated with Professor W. Drucker's group of the Department of Surgery, in studying changes in blood insulin level in shock secondary to haemorrhage and the effect of shock on the insulin response to a glucose load. With Professor J. Hunter, the influence of fatty acid administration on the effect of glucose in stimulating insulin secretion is being investigated. Dr. B. J. Lin has been studying the synthesis of proinsulin and the formation of insulin in isolated rat islets and has shown the effect of glucose and a variety of metabolites on this synthesis in the presence and absence of mannoheptulose. Dr. A. Niki has undertaken similar studies in a diabetic strain of rat. Mr. A. Sun is investigating the relation of islet mass to islet function.

Professor M. J. Santalo has investigated the effect of glucagon on glucose metabolism in the rat, with particular emphasis on the changes produced by glucagon in the distribution of glucose between liver cell water and plasma water.

In Professor G. Hetenyi's section, Dr. J. S. Cowan and Dr. Hetenyi elaborated a new tracer method for continuously following the rates of release and uptake of metabolites into and from the blood-plasma. Applying this method to the study of hepatic glucose release and overall glucose utilization in conscious normal and diabetic dogs, they have characterized, in terms of control theory, the homeostatic mechanisms maintaining blood glucose level in such animals. Dr. K. H. Norwich is working on a new mathematical model describing the distribution and utilization of injected glucose in dogs. The validity of a possible linear model has been established. Mr. P. D. Dalziel is studying the kinetics of potassium uptake into the liver cells of rabbits *in vivo*, using a computer-linked semi-conductor radiation detector and ^{42}K as tracer. The geometry and some of the technical aspects of such measurements have been worked out in the section previously by Mr. D. R. Studney, Mr. Howell, Mr. P. Dalziel, and Dr. G. Hetenyi. Work on some problems in tracer methodology is also in progress.

In Professor J. Campbell's section, Dr. K. S. Rastogi and Dr. Campbell, in co-operation with Dr. G. Hetenyi completed a study of the role of the adrenal glands in the responses of dogs to growth hormone and glucocorticoids. They found that in the absence of the adrenal glands, the hyperinsulinemic effect of growth hormone was diminished and was only partially restored by the administration of glucocorticoid. Dr. Rastogi and Dr. Campbell found that cortisone administration produced initially a marked elevation in serum insulin with accompanying reduction in pancreatic insulin, but later, though serum insulin remained high, the pancreatic insulin returned to normal levels. Several other steroid hormones had no effect on serum insulin. The effects of growth hormone on renin activity and on electrolytes in serum, with the accompanying changes in insulin, glucose, and lipids are being studied by Dr. Rastogi and Dr. Campbell in co-operation with Dr. M. Cohanim of Queen's University. Dr. Rastogi is also investigating effects of hormonal treatments on rates of synthesis of insulin *in vivo*. Dr. J. Pierluissi has completed a study of a muscle enzyme system which destroys insulin. Effects of inhibition of the enzyme on the action of insulin on muscle tissue *in vitro* were investigated. He is now studying insulin secretion during continuous infusions of hormones and metabolites.

In Professor A. M. Rappaport's section, the effects of hepatic arterial ischemia, as compared to portal venous ischemia, on survival and metabolism of partially and totally depancreatized dogs, has been studied with Dr. T. Kawamura and Dr. J. S. Cowan. Hepatic arterial ischemia greatly prolongs survival of partially depancreatized diabetic dogs not treated with insulin, whereas portal venous ischemia does not. The study of the rate of nitrogen excretion in the adult dog during prolonged fasting has been continued in collaboration with Dr. G. A. Wrenshall, Mr. H. Kreiger, and

Mr. L. Erlich. Film recordings of the micro-circulatory changes in the liver of rats after the ingestion of fulvine have been organized into a silent colour motion picture. The earliest ultrastructural changes and the ensuing biochemical alterations in the liver of rats due to toxic hepatitis after ingestion of fulvine are being studied together with Dr. E. Porta of the Hospital for Sick Children. A physical model of intrahepatic circulation has been developed together with Professor M. E. Charles and Mr. J. L. Loch of the Department of Chemical Engineering. Work has been continued with Drs. T. Kawamura, B. J. Lin, R. E. Haist, Mr. Henderson, and Professor N. F. Moody on the effects of various agents on pancreatic blood flow and the effects on insulin output of an increase or decrease of pancreatic blood flow and of the infusion of hormones into an isolated portion of the pancreas.

In Professor D. W. Clarke's section, investigations have continued on a method for the assay of glucagon using a sensitive biological response. Studies of lipolytic activity have shown differences between sera from patients suffering from multiple sclerosis and sera from normal persons.

Professor J. Grayson, with Mr. R. L. Coulson and Mr. Brian Winchester, is investigating blood flow in the myocardium of the left ventricle and heat production in the muscle of the left ventricle. They have been studying pre- and post-network resistance changes during progressive reduction in blood pressure, with haemorrhage, with adrenaline, noradrenaline, acetylcholine, and vasodilator drugs. Studies of coronary occlusion showed that acute ligation of a major coronary vessel does not immediately reduce flow to zero, but the flow is progressively reduced until, after 6 hours, it is zero and infarction ensues. During this early period flow can be temporarily restored by certain vasodilator drugs.

In the section of Professors Otakar and Anna Sirek, with Drs. A. and H. Niki, Visiting Scientists from the University of Nagoya, Japan, the lipolytic effect of growth hormone in dogs was investigated in normal, hypophysectomized, depancreatized, and Houssay dogs. The data indicate that the process is insulin-dependent and that dihydroergotamine, by a mechanism probably not involving adrenergic receptors, facilitates lipolysis in response to a single injection of GH. Dr. N. Hotta, a postdoctoral fellow from Nagoya, Japan is using the isolated fat cell preparation to study the lipolytic effects of growth hormone. The differences between prolactin and placental lactogen are being studied by Mr. Kelvin Chan. With Dr. H. F. MacKay and Miss Margaret Loughney, a study of the distribution of glycosaminoglycans, collagen, and elastin in aortic and dermal tissues of endocrine-deficient animals, including four types of spontaneously diabetic rodents, is being carried out as part of a study of the control of connective tissue in diabetes mellitus. Insulin-deficient animals, in comparison with normal animals, have smaller amounts of glycosaminoglycans, collagen, and elastin in aorta and skin. The glycosaminoglycan content is not related to the plasma glucose concentration in diabetic animals. The three parameters are low in concentration also in hypophysectomized dogs. The effect of hormonal replacement therapy is being studied. A preliminary investigation has been carried out on the mechanism of insulin release by a new oral hypoglycemic agent, glybenzcyclamide (HB-419).

Professor J. W. Pearce, along with Mr. A. T. Veress, Dr. E. Houttuin, Mr. U. Ackermann, Dr. H. Bengele, and Professor H. Sonnenberg has studied the regulation of body fluid volume by the kidneys. Cross-circulation experiments have demonstrated that the response of the kidney to increases in circulating blood volume is not, as previously believed, due to the action of a hormone. Other experiments have, however, shown that a blood borne factor can alter the ability of the kidney to respond and thus may control body fluid volume conservation during water or salt deprivation. Other research, using specialized perfused dog kidneys, suggests that intact nerve pathways to the kidney are also not essential to this control mechanism but may modify its effectiveness. In Dr. Pearce's section also, Dr. B. Lichardus, from Bratislava, Czechoslovakia, was a Visiting Scientist receiving special support from

the Ontario Heart Foundation. Dr. Howard Bengele is a Postdoctoral Fellow of the Medical Research Council.

Professor Sonnenberg has collaborated with Professor Pearce in a number of studies on sodium excretion and regulation. In addition, in Dr. Sonnenberg's section, Dr. Wilczewski, a Visiting Scientist, studied urea flux from perfused loops of Henle. Micro-perfusion studies on rat proximal tubule are in progress to determine whether proximal Na-reabsorption is affected by chronic salt-loading or salt-depletion.

Professor M. Vranic has continued work on dogs with quantitatively matched insulin infusion, a method permitting a study of the hormonal and metabolic interactions independent of variations in insulin secretion near normal homeostasis and dynamic steady state of glucose, and simulation studies. It was found that small infusions of glucagon markedly affect the endogenous glucose production but their effect on the overall glucose utilization is dubious. A simulation study is in progress in which the infusion rates of glucagon and insulin are varied concurrently to change the turnover of glucose but at normal glucose levels. Tracer studies, including recycling of the label, are being performed with Mr. A. Cherrington and Mr. P. Fono. In collaboration with Professor G. Hetenyi and Dr. K. Ishiwata, it was shown that ribose, a potent hypoglycemic agent, is without effect in these dogs, suggesting that ribose acts only through insulin release. Moderate glucose infusions did not affect the endogenous glucose production, thus showing that extra insulin is needed for these adaptive mechanisms of the liver. In collaboration with Professor G. A. Wrenshall and with the assistance of Mrs. N. Kovacevic, it was shown that in dogs on intraportal infusion the endogenous glucose production increases during exercise and, since the rate of glucose utilization does not increase, the concentration of plasma glucose rises.

In Professor J. Hunter's section, with Mr. O. R. Waler, the relationship between plasma glucose free fatty acid and insulin levels has been studied. Intravenous injection of glucose and free fatty acid showed that levels were elevated by the injection of glucose but were elevated to a greater degree by the injection of glucose plus free fatty acid. The intravenous infusion of adrenaline raised glucose and free fatty acid levels with little effect on insulin levels. When glucose plus free acid were injected intravenously during adrenaline infusion there was prolonged elevation of plasma glucose and free fatty acid levels and an apparent bimodal elevation of serum insulin. Investigations of the effects of chronic administration of glucose and free fatty acid are in progress.

In Professor D. R. Crapper's section, the pathophysiology of neurofibrillary tangles is being investigated by means of intracellular microelectrode recordings from cortical and spinal neurons. In conjunction with Mr. M. Skopitz, a miniature tape recorder has been developed for simultaneous recording of human EEG and EKG as part of a study on the relation of cardiac dysrhythmias to neurological disorders in mobile patients. Computer analysis of neuronal models has been undertaken as part of the study on neurofibrillary tangles. Dr. W. Tatton is studying reticular gating mechanisms on lateral geniculate neurons. He has developed, in conjunction with Mr. D. Strong, a pulse height analyser for single cell analysis.

Professor L. W. Organ's section has been investigating somatosensory nuclei of the human thalamus by stimulation and microelectrode recording. Identification of brain structures by measurement of electrical impedance has been undertaken and, with Mr. H. C. Kwan, continuous measurement of specific impedance of brain tissue has been carried out.

In Professor J. W. Scott's section during the past year, with Dr. James Love and Mr. P. Gibault, work has been continued on the activity of the medial geniculate body in response to sensory stimulation. With Mr. David Johnson, the induced cerebral cortical responses to electrical stimulation of the semicircular canals is under investigation.

Professor R. M. Preshaw came to the Department in December and has set up

a laboratory in gastrointestinal physiology. He has started studies on reflex stimulation of gastric secretion.

Professor F. C. Monkhouse, with Mrs. Susan Milojevic and Miss Lorna Brennan, has continued studies on the physiological function of antithrombin. Miss Adrianne Schmitt is studying the relationship between antithrombin and antiplasmin. These two activities are associated with chemically similar proteins. In collaboration with Dr. R. MacMillan of the Department of Medicine and Mr. Campbell Cowan of the Banting and Best Department of Medical Research, a study of red cell clumping and fibrinogen levels in patients suffering coronary thrombosis is in progress. Miss Anne Hedlin, with the technical assistance of Miss M. A. Rompila, is studying the effect of hormones on the fibrinolytic system. Particular attention is being focused on the female sex hormones, insulin, and noradrenaline. Miss Valerie McAlpine is investigating the use of small column chromatography to separate plasminogen and plasmin from human plasma, in order to study the activating effect of exercise and stress on the fibrinolytic system.

HONOURS

Dr. J. W. Pearce, President of the Canadian Physiological Society during the 1968–69 session.

Dr. J. W. Scott, appointed to Toronto Historical Board; appointed Chairman of DRB panel on Aviation and Underwater Physiology; elected Vice-President, Academy of Medicine, Toronto.

THESES COMPLETED

Ph.D. Theses

Cowan, John Scott (1969), "Development and evaluation of a new tracer method and its application to an analysis of the glucoregulatory system in dogs"; Love, James A. (1969), "The sensory integrative activity of the medial geniculate body."

M.Sc. Theses

Benoit, Brien G. (1968), "The physiology of harmaline-induced tremor"; Brosky, Gerald (1968), "Experimental diabetes induced by streptozotocin"; Hall, J. D. (1968), "The effects of methylprednisolone and ACTH on certain quantitative aspects of lactate metabolism in dogs"; Holmes, Roger (1968), "Mucopolysaccharides in peritoneal mast cells of rats"; Kwan, H. C. (1969), "Continuous specific impedance measurement of brain tissue along a trajectory"; Picton, T. W. (1969), "Cortical evoked responses to VIIIth nerve stimulation"; Pierluissi, J. (1969), "Preservation of immunochemical and biological activities of insulin by insulinase inhibitor"; Purdon, David (1968), "The physiological importance of antithrombin."

SCHOLARLY ADDRESSES

J. Campbell, K. S. Rastogi, G. R. Green, and V. Lazdins, "Enhancement of the utilization and secretion of insulin by growth hormone in the dog," Proc. Can. Fed. Biol. Soc., June, 1969.

Mr. A. Cherrington, "Effect of insulin and glucagon in dogs following removal of the pancreatic autograft," Toronto Diabetes Association, May 5, 1969, and Canadian Federation of Biological Societies, June 13, 1969.

J. Grayson and R. L. Coulson, "Observations on blood flow in myocardium," International Conference on Microcirculation, European Society for Microcirculation, Gothenburg, Sweden, June, 1968; "Observations on arterial collateral communications in the dog heart," Proceedings of Physiological Society, Edinburgh, July, 1968; "Method for measurement of blood flow and collateral back pressure in

extra-corporeal circulations." Proceedings of International Union of Physiological Sciences, XXIV International Congress, Washington, D.C., August, 1968; "Reactivity of anastomotic vessels in coronary circulation," La Société Canadienne des Physiologie, La Chante Clair, Ste Adèle-en-Haut, Quebec, January, 1969; "Pressure flow relations in myocardial blood vessels," and "Coronary artery pressures," Canadian Federation of Biological Societies, Edmonton, Alberta, June, 1969.

Dr. R. E. Haist, "Bioassay of insulin," Diabetes Workshop, Mont Gabriel, Quebec.

Dr. J. Hunter participated in "Workshop" for Industrial Audiometric Technicians offered by the Division of Extension and the School of Hygiene, University of Toronto (by invitation).

Dr. A. Niki, "Beta-adrenergic stimulation and insulin release in dogs following administration of HB-419," Toronto Diabetes Association.

Dr. J. W. Pearce, "Renal regulation of extracellular fluid volume," University of Montreal, Department of Physiology, October, 1968; "The control of sodium excretion by the kidney," University of Western Ontario, Department of Physiology, April, 1969.

To be given before June 30, 1969: "Absence of transferred natruiresis in cross-circulated rats," Czechoslovak Academy of Sciences Symposium on Natruiretic Hormone, Bratislava, June, 1969; "Intrarenal and extrarenal factors in the natruiresis of volume expansion," IVth International Nephrology Congress, Stockholm, June, 1969; "Lack of evidence for natruiretic hormone in cross-circulated rats," Can. Federation of Biol. Soc. Meeting, Edmonton, June, 1969.

J. Pierluissi and J. Campbell, "Preservation of immunochemical and biological activities of insulin by insulinase inhibitor *in vitro*," Toronto Diabetes Association, March, 1969, and American Diabetes Association, New York, June, 1969. (Abstract)

K. S. Rastogi and J. Campbell, "Hyperinsulinemia produced by glucocorticoids, and modulation of the effect by growth hormone in the mouse," Toronto Diabetes Association, April, 1969.

Dr. A. M. Rappaport, "Experimental veno-occlusive disease; *in vivo* microcirculatory: cinematographic study of hepatic pathology" and "Normal and pathologic microcirculation of the mammalian liver, illustrated by microcinematography," International Conference on Microcirculation, Gothenburg, Sweden, June 24–28, 1968; "Experimental toxic hepatitis after the ingestion of fulvine, a microcirculatory study" and the film "Experimental hepatic veno-occlusive disease, *in vivo* microcirculatory study," 8th International Congress of Gastroenterology, July 7–13, 1968, Prague, Czechoslovakia; "Effects of hepatic artery ligation on survival and metabolism of partially and totally depancreatized dogs," Vth Meeting of the International Association for the Study of the Liver, Carlsbad (Czechoslovakia), July 14 and 15, 1968; "Quantitative determination of insulin output following an intravenous glucose tolerance test in the dog" and "Normal and pathologic circulation of the Liver," Guest lecturer at the Department of Clinical Pharmacology and at the Department of Anatomy, University of Berne (Switzerland), July 19, 1968; "From liver cell and organelle to hepatic structure and microcirculation," Seminar at the Banting and Best Department of Medical Research, March 27, 1969; "Experimental hepatic veno-occlusive disease, *in vivo* microcirculatory study," at the 2nd Film Symposium of the National Research Council, Ottawa, April 27, 1969.

Dr. A. Sirek, "Acute effects of growth hormone on plasma free fatty acids in dogs," at the Second Hoechst Diabetes Workshop at Mont Gabriel, Quebec; "Mechanism of action of the hypoglycemic agent HB-419," Department of Biochemistry, Faculty of Medicine, University of Munich.

Dr. O. V. Sirek, "Some aspects of acute metabolic effects of growth hormone," Symposium on Growth Hormone in Boston, organized by the American Diabetes Association; "Beta-adrenergic stimulation and insulin release in dogs following administration of HB-419," International Symposium on Diabetes, Tegernsee, Germany;

"Studies of the mechanism of acute lipolysis after growth hormone," Department of Biochemistry of the Faculty of Medicine, University of Munich; "The effect of growth hormone on plasma amino acids in dogs," at the Second Hoechst Diabetes Workshop at Mont Gabriel, Quebec.

Dr. H. Sonnenberg, "Evidence for a humoral factor modifying the renal response to blood volume expansion," Canadian Physiological Society, at Ste Adèle-en-Haut, Quebec, Jan. 10–11, 1969.

Dr. M. Vranic, "The physiological challenges in dogs with quantitatively matched insulin infusion," Banting and Best Department of Medical Research, Toronto, December 16, 1968; "The effect of glucose, glucagon and exercise in dogs with matched insulin infusion," Joslin Research Laboratory, Boston, April 3, 1969; "Exercise, insulin and glucose turnover in dogs," Toronto Diabetes Association, May 5, 1969; "Exercise, insulin and glucose turnover in dogs," Canadian Federation of Biological Societies, June 13, 1969.

PUBLICATIONS

Campbell, J., and Rastogi, K. S. "Elevation in Serum Insulin, Albumin, and FFA, with Gains in Liver Lipid and Protein induced by Glucocorticoid Treatment in Dogs" (*Canadian Journal of Physiology and Pharmacology*, vol. 46, 1968, pp. 421–9).

Cherrington, A., Vranic, M., Fono, P., and Kovacevic, N. "Effect of Insulin in Dogs following removal of the Pancreatic Autograft" (*Proceedings of the Canadian Federation of Biological Societies*, vol. 12, 1969, p. 64) (abstract).

Cowan, J. S., Vranic, M., and Wrenshall, G. A. "Effects of Preceding Diet and Fasting on Glucose Turnover in Normal Dogs" (*Metabolism*, vol. 18, 1969, pp. 319–30).

Cowan, J. S., Schacter, D., and Hetenyi, G., Jr. "Validity of a Tracer Injection Method for Studying Glucose Turnover in Normal Dogs" (*Journal of Nuclear Medicine*, vol. 10, 1969, pp. 98–102).

Davidson, J. K., Zeigler, M., and Haist, R. E. "Failure of Guinea Pig Antibodies to Beef Insulin, Chicken Insulin and Cod Insulin to Neutralize Capybara Insulin" (*Diabetes*, vol. 18, 1969, pp. 212–15).

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Grayson, J., and Coulson, R. L. "Observations on Arterial Collateral Communications in the Dog Heart" (*Journal of Physiology*, vol. 198, July 1968, pp. 87–8).

Haist, R. E. "Current Concepts in Diabetes" (*Canadian Medical Association Journal*, vol. 99, Nov. 30, 1968, pp. 1017–25).

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Hetenyi, G., Jr., and Wrenshall, G. A. "Adaptive Changes in Rates of Appearance and Disappearance of Glucose in Dogs following Step Changes in the Rate of Glucose Infusion" (*Canadian Journal of Physiology and Pharmacology*, vol. 46, 1968, pp. 391–8).

Pearce, J. W. "Renal Nervous and Spinal Pathways and the Reflex Regulation of Extracellular Fluid Volume" (*Federation Proceedings*, vol. 27, 1968, pp. 1142–8).

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Rappaport, A. M., Vranic, M., Campbell, J., Green, G. R., Cowan, J. S., and Wrenshall, G. A. "Effects of Hepatic Artery Ligation on Survival and Metabolism of Depancreatized Dogs" (*American Journal of Physiology*, vol. 215, 1968, pp. 898–907).

Rastogi, K. S., and Campbell, J. "Hyperinsulinemia produced by Glucocorticoids, and Modulation of the Effect by Growth Hormone in the Mouse" (*Federation Proceedings*, vol. 28, 1969, p. 574).

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PSYCHIATRY

Under the direction of Professor R. C. A. Hunter

The academic year 1968–69 has been an eventful one for this Department.

POSTGRADUATE EDUCATION

During the year, 85 postgraduate students and 4 Fellows were registered in the Department. New mechanisms were introduced in order to achieve better communication and feedback between teachers and students, and two postgraduate students were placed on the Postgraduate Committee so that student representatives could participate in the decision-making which had a bearing on their education and welfare. Dr. V. M. Rakoff replaced Dr. W. J. Stauble as Director of Postgraduate Education. The postgraduate curriculum was revised and further changes are pending.

Arrangements were completed to ensure that the Department would be able to discharge its obligations in the new undergraduate curriculum.

Members of the Department participated in teaching in many areas, including the School of Hygiene, the School of Social Work, and the School of Nursing. In the hospitals, a great deal of teaching was also provided for child care workers, occupational therapists, psychologists, and other workers in the mental health field.

The PH.D. Minor course for the Faculty of Arts and Science continued to attract registrants.

CLARKE INSTITUTE OF PSYCHIATRY

The Institute received full approval from the Canadian Council on Hospital Accreditation. Institute staff have undertaken to provide ongoing consultative services to a rural community endeavour in the Timmins–Porcupine area. Previously unused beds were opened as the recruitment of staff permitted. An ambulant patient service was established under Dr. J. M. Davie, and 3,500 appointments per month are now being booked. The Community Service continues to develop and the internal organizational changes have led to the appointment of Dr. R. C. A. Hunter as Director and Psychiatrist-in-Chief, Dr. R. E. Turner as Associate Director, Medical, and Dr. R. J. Mahabir as Assistant Medical Director. Parallel administrative changes will take place. A Research Committee has been formed which should allow improved co-ordination and administration of the Institute's research efforts.

GENERAL HOSPITALS

The departments of psychiatry in several of the teaching general hospitals, namely the Toronto General Hospital, St. Michael's Hospital, and the Hospital for Sick Children, have had their physical facilities renovated or enlarged. To strengthen the corps of teachers in the general hospitals, several appointments have been made and a significant number of previously part-time psychiatrists accepted full-time appointments.

To meet the requirements of the Province's new Mental Health Act, all the general hospitals now, or very soon will, provide in-patient care, ambulant patient services, emergency care, day care, and community consultation.

Special mention should be made of increased outpatient services at the Hospital for Sick Children, and the inauguration of a community Mental Health Centre at the Toronto Western Hospital. In the latter hospital also, special psychiatric consultative arrangements to the Renal Transplant Unit have led to similar development within the Arthritis and Rheumatology Unit. Psychiatric consultative services with the general hospitals have been generally strengthened.

CHILDREN'S FACILITIES

Within the University network, opportunities for training in child and adolescent psychiatry are provided by the Hospital for Sick Children, the Child & Adolescent Unit at the Clarke Institute of Psychiatry, the C. M. Hincks Treatment Centre, Mental Retardation Centre, and Thistletown Hospital. This programme, because of its experienced teachers, extensive facilities, and integrated format, is rapidly gaining in recognition as a training resource for child psychiatrists, social workers, clinical psychologists, child care workers, and nurses.

MENTAL HOSPITALS

The Queen Street Mental Health Centre has completed its programme of re-organization. Active treatment has been separated from infirmary-nursing-domicillary programmes and clinical teams now relate to geographic and functional areas in the city of Toronto. This re-orientation, along with re-organization of teaching staff, has resulted in improved educational and research opportunities.

ACADEMIC VISITORS

Throughout the academic year a number of distinguished psychiatrists have visited to deliver lectures and conduct seminars. These included Dr. Thorsten Sjovall, Vice-President of the Swedish Psychoanalytic Society and Head of the Psychiatric Service of the Mental Health Clinic, City of Stockholm; Dr. M. Laufer, member of the London Institute of Psychoanalysis; Dr. G. Morrison Carstairs, Professor of Psychological Medicine, University of Edinburgh, and President, World Federation for Mental Health; Dr. Hilliard Jason, Professor and Director of the Office of Medical Education Research and Development, Olin Memorial Health Centre, Michigan State University, East Lansing; Dr. Jacob Christ, Psychiatrist-in-Charge of the Outpatient Clinic, McLean Hospital, Belmont, Massachusetts; Prof. Weston La Barre, Professor of Anthropology at Duke University, Durham, North Carolina; Dr. Harold Hillman, Reader in Physiology, Department of Biological Sciences, University of Surrey, England; Dr. Ralph Hirschowitz, Research Associate, Harvard Medical School, Department of Psychiatry, The Laboratory of Community Psychiatry, 58 Fenwood Road, Boston, Massachusetts; Dr. Ronald Melzack, Professor of Psychology at McGill University.

In addition, Dr. Marcel Lemieux, Medical Superintendent of the Hôpital-des-Laurentides, was the Hoffmann-La Roche Lecturer.

Certification and Fellowship in Psychiatry of the Royal College of Physicians and Surgeons of Canada
Fifteen trainees passed the specialist examinations of the Royal College and, of these, three obtained Fellowship.

Diploma in Psychiatry of the University of Toronto
Ten students obtained the Diploma in Psychiatry.

Postgraduate Courses
In April, a postgraduate course in Forensic Psychiatry was held under the sponsorship of the Division of Postgraduate Medical Education.

In June, a workshop on psychoanalytic group psychotherapy was held, sponsored jointly by the Division of Postgraduate Medical Education, Department of Psychiatry, and the School of Family Psychiatry and Community Mental Health of the Tavistock Institute of Human Relations.

Publications
Special mention should be made of the second Clarke Institute Publication *Sexual Deviations in the Criminal Law* by Alex Gigeroff, B.A., LL.D. This book was also awarded the Clarke Institute of Psychiatry Research Fund Prize for the year.

RESEARCH

The Clarke Institute of Psychiatry is rapidly becoming a national centre where many types of psychiatric research converge. Already this is beginning to lead to interdisciplinary investigations and invigorating indications of new and creative directions of research effort. Such cross-fertilization trends have been encouraged by the forging of linkages between research sections and clinical services and by the funding of certain clinical research enquiries from intramural sources. Examples of this fruitful collaboration will be seen as a theme running throughout this report.

Dr. N. W. Bell has launched an ambitious enquiry into the dynamic properties of family life. A team of twelve investigators has already collected data on 300 families of a selected urban community and it is hoped that a longitudinal study of a carefully selected number of variables in a final population sample a hundred times the present size may be possible. As a *leitmotiv* to this community effort, Dr. Bell with Dr. G. Shugar, undertook a study of patient-family involvement during the in-patient hospitalization of a series of patients admitted to one of the clinical services of the Clarke Institute. The implications of the results of this study may well lead to modifications in ward management and treatment goals.

Similarly linking hospital and community, Dr. S. Freeman's hospital community service has continued its efforts to develop a model community mental health network in the borough of East York. This same borough's people have been the objects of study by Dr. D. Coates and members of the research section of Community studies, in continuation of the Yorklea project. B. Welman analysed the results of a Household environment survey; N. Shulman enquired into changes in life events, mental health, and personal relationships; J. Glickman studied urban social participation; and D. O'Neill has been engaged in attempting to measure the caseload of the borough's Public Health Department.

The family has also been of research interest to the Psychology Department. Dr. D. Paitich continues his efforts to standardize his parent-child relations questionnaire for clinical application to adult patients. He has also sought to develop a marital relations test and a test to probe the child's view of his parents' behaviour. Also from Psychology, Dr. K. Ferguson has been working on an automated test battery and on verbal coding in psychotherapy. D. Quirk has continued his data collection for an operant conditioning technique which he has devised.

The research section of Social Pathology has maintained its clinical links with

the forensic service of the hospital. Under Dr. J. W. Mohr a number of studies have been completed, including one on the child victims of sex offenders and a definitive publication by A. Gigeroff entitled *Sexual Deviations in the Criminal Law.* In the same general field, C. Greenland has begun an enquiry into the nature of the relationship between violence and mental disorder, as well as continuing his fruitful series of historical studies in Canadian psychiatry.

On the Clinical Investigation Unit, a two-year study on the use of lithium carbonate as a prophylactic agent against recurrent depressions has been brought to a close by Drs. H. Stancer, Godse, and Furlong. This work was reported to the annual meeting of the Canadian Psychiatric Association in Toronto on June 16, 1969. The clinical and biochemical correlates of a 48-hour affective psychosis have been completed by Drs. Stancer and Godse and are being prepared for publication. Miss Wilgosh has arranged for the computerizing of the behaviour check lists for greater objectivity and convenience. Drs. Lyall, Quarrington, and Stancer have completed the factor analysis of their current behaviour check list and are preparing it for publication and for further use on the ward.

In the Metabolic Laboratory, the method developed by Drs. Stancer and Godse for the continuous automated *in vivo* measurement of blood cholesterol has been submitted for publication. Studies have also been started by the above on a continuous automated *in vivo* method for blood free fatty acids with Mrs. V. Grant and measurements on the diurnal rhythms of human plasma amino acids with Mrs. Newman.

In Neurochemistry, Drs. Bazan and Stancer, with Dr. Peachey, are conducting a study on the effects of biogenic amines on primate behaviour. Mrs. Czarnocki, Dr. Sastry, and Dr. Stancer have completed their work on the P^{32} uptake into phospholipids of human pineal gland and compared it with other endocrine and non-endocrine tissues. Dr. Bazan has begun some studies on the control mechanism of excitable membrane lipid components as well as extending his studies on lipid degradative enzymes of brain subcellular fractions.

On the Research Service, Drs. J. W. Lovett Doust and L. B. Raschka commenced a clinical and patho-physiological study of cases of symptomatic schizophrenia and have continued their enquiries into the cerebro-vascular accompaniments of changing levels of awareness. In the section of psychophysiology, data collection and analysis of rheoencephalograms has proceeded. G. E. Harris has tested the potential of a Russian-designed electronic "sleep machine" to facilitate sleep in insomniac patients and has pursued his experiments in telemetering pulse, EKG, and EEG recordings in human subjects.

In the section of Psychopharmacology, Dr. O. Hornykiewicz commenced a study of the action of L-Dopa on the locomotor activity in mice in relation to the regional distribution of this compound and its metabolites, including noradrenaline. The aim of this study is to provide a better understanding of the mechanisms by which L-Dopa exerts its beneficial effect on the extrapyramidal symptoms in patients with parkinsonism. Also under study is the action of phenothiazine derivatives on the dopamine metabolism in the caudate nucleus of rabbits in relationship to the extrapyramidal potency of these compounds.

In the section of Neuroendocrinology, Dr. G. M. Brown completed a study of adrenal regulation in the tamed squirrel monkey. It was found that taming did not alter the uniquely high resting cortisol levels or the dramatic cortisol response to stress previously noted in this animal. Dr. Brown has also initiated some preliminary studies with Dr. Hornykiewicz which have shown that it is possible to measure the Dopamine and noradrenaline content in the hypothalamus of the rat during physiological experiments. Extension of these studies could lead to a delineation of the monoamine systems controlling pituitary function.

Outside the Clarke Institute, a great deal of research work has been pursued in the Provincial institutions and general hospitals which make up the balance of the University Department of Psychiatry.

At Thistletown Hospital Dr. H. R. Alderton has continued his work with the Children's Pathology Index. He has found it a reliable instrument in predicting post-discharge adjustment and response to treatment in groups of disturbed boys in hospital and under Children's Aid Society care.

At Queen Street Mental Health Centre, Dr. J. R. Dukszta heads a team of professionals in studying democratic power sharing in an active psychiatric service. A series of highly sophisticated sociometric techniques are being employed in this clinical investigation and its impact on the rest of the hospital as well as on the patients actively involved is a focus of great interest. In the biochemical laboratories of the research service of the Centre, Dr. B. A. Cookson, L. Huszka, and Mrs. D. Zabek completed a detailed longitudinal study of steroid excretion patterns in a case of recurrent catatonic illness. The results show that each attack of catatonia was associated with a rise in steroids of adrenal rather than ovarian origin: diurnal variation of potassium excretion and plasma steroid levels have also been studied in relation to the effects of antidepressant medication in patients with endogenous depression. In the psychophysiological laboratory of the research service, Dr. Lovett Doust, with J. Mourant and Mrs. M. Duval, has investigated the effect of psychotropic drugs on the cerebrovascular dynamics of patients with schizophrenia.

At the Northeastern Psychiatric Hospital, Porcupine, Dr. P. H. Melville has opened and organized a new concept of community mental health. In collaboration with a number of colleagues from Toronto who have regularly visited this new institution, a research programme has been initiated which has attempted to record and question the general organization of the treatment programme. Programme design research, anthropological studies, demographic sociological studies, and data collection by means of an unusual journal system are some of the means being used to provide approaches, directions, and codification of this venture in the North.

In the Department of Psychiatry at Sunnybrook Hospital, Dr. W. E. Boothroyd reports psychiatric collaboration in some biochemical investigations on patients with manic-depressive disease. Correlations are being sought between the clinical symptoms of these patients and variations of the levels of corticosteroids, monoamines, and electrolytes. Another research enquiry concerns the electrical activity of the brain associated with various language modalities. E. Douglass has already completed some pilot studies of cerebral hemisphere symmetry factors in learning disorders and EMG and EEG activity during verbal expression.

At New Mount Sinai Hospital, Dr. D. R. Freebury has made a pilot study of the possible effect of an intensive care setting on a patient's psychopathology. Dr. G. Boujoff has investigated the personality patterns of a group of unwed mothers. Dr. S. E. Greben and Dr. W. Otto have collaborated in studying the effects of L-Dopa on parkinsonism and of the psychological response of coronary patients to jogging exercise. Dr. G. A. Baker has used the growth inhibition of lactobacillus by phenothiazine compounds as a method of determining the pharmacological potency of these psychotropic drugs.

At Toronto Western Hospital, Dr. E. F. W. Baker has attempted to confirm suggestions in the literature that a correlation exists between rate of transfer of sodium from blood to CSF and mecholyl blood pressure response and clinical psychiatric diagnosis. Pilot results tend to confirm these relationships. Dr. Mary Seeman has made a pilot trial of protriptyline HCl in ambulatory depressed out-patients. She has also begun a linguistic analysis of the spontaneous writings of schizophrenic patients.

At the Hospital for Sick Children, Dr. G. H. C. Greenbaum attempted a replication of the claim that niacinamide is of benefit in schizophrenia. A double blind study using niacinamide, niacinamide plus tranquillizer, and placebo in 57 schizophrenic children was conducted over a six-month period. No significant improvement took place.

At Toronto General Hospital, Dr. R. Pos and his colleagues have continued their work with the informational underload hypothesis. Originally evolved to ex-

plain hallucinations, this theory is now being employed to explain states characterized by the Freudian primary process, i.e. psychotic decompensation, primary process dreaming, and the earliest phase of life. Using neurophysiological data from cats and human subjects, mathematical pattern extraction techniques are realized through digital computers.

HONOURS

H. R. Alderton, Secretary, Ontario Psychiatric Association.

J. D. Atcheson, Chairman, Committee enquiring into the Mental Health Service, Yukon and Northwest Territories.

P. A. Christie, President, Ontario Psychiatric Association; Canada Centennial Medal.

C. B. Farrar: His Excellency, The Right Honourable Roland M. Michener, Governor General and Chancellor of the Order of Canada, held a private investiture on May 5, 1969, in Dr. Farrar's home, and presented Dr. Farrar with the Medal of Service of the Order of Canada.

K. G. Gray, Honorary Counsel, Canadian Psychiatric Association; Member, Honorary Council, Canadian Association of Occupational Therapists (Ontario).

R. C. A. Hunter, Elected Fellow of the American College of Psychiatrists; Chairman, Research Committee, Academy of Psychoanalysis; Member, Nucleus Committee on Psychiatry, Royal College of Physicians and Surgeons of Canada.

M. V. Jackson, Life Fellow, Academy of Medicine, Toronto.

A. L. Jones, Fellow, Royal College of Physicians of Ireland.

J. W. Lovett-Doust, Fellow, Royal College of Physicians and Surgeons (London).

M. C. McEwan, elected President, Academy of Medicine, Toronto.

D. Paitich, Chairman, Committee on Professional Affairs, Ontario Psychological Association.

A. Parkin, Chairman, Canadian Institute of Psychoanalysis (Ontario).

W. J. Stauble, President, Ontario District Branch, American Psychiatric Association; President, Canadian Psychoanalytic Society (Ontario).

P. D. Steinhauer, Chairman, Section on Child and Adolescent Psychiatry, Ontario Psychiatric Association.

R. E. Stokes, Fellowship, American Psychiatric Association.

SCHOLARLY ADDRESSES

Dr. E. F. W. Baker, "Current Aspects of Hallucinogens," Combined sections of Medicine and History of Medicine, Academy of Medicine, Toronto.

Dr. G. M. Brown, "The Fine Structure of the Adrenal Cortex of the Male Squirrel Monkey: A Model of Chronic Stress," American Association of Anatomists Annual Meeting, Boston (delivered by Dr. D. P. Penney, co-author).

Mrs. D. Burwell, "Nurse-Patient Encounter," chaired a Panel, McGill University, Montreal; "Problems which Nurses have with Community," Victorian Order of Nurses, Greater Toronto Branch; "Counselling the Emotionally Disturbed," Scarborough Public Health Department.

Dr. K. G. Ferguson, "Communication Problems between Behavior Modifiers and Psychotherapists," Institute of Child Study, University of Toronto.

Dr. S. J. J. Freeman, "Mental Health and the General Hospital," North Toronto Medical Association; "Community Mental Health," "Community Services and Social Change," an Interdisciplinary Workshop, sponsored by Board of Education, Borough of North York; "The Changing Role of the Social Worker," Alumni-Faculty-Student Symposium, School of Social Work Alumni Association; "The Place of Mental Retardation Facilities in Community Mental Health Services," Mental Retardation Centre, Toronto.

Professor K. G. Gray, "Psychiatric Evidence in Criminal Cases," Faculty of Law, Dalhousie University, Halifax; "Legal Problems in Medical Practice," Faculty of Medicine, Dalhousie University, Halifax.

Mr. C. Greenland, "Appealing Against Commitment," Western Ontario Regional Conference of Social Work; "Treatment under Compulsion," 6th Research Conference, Quebec Society of Criminology.

Dr. O. Hornykiewicz, "Differential Action of Chlorpromazine on the Dopamine Metabolism in the Substantia Nigra and the Striatum," Research Conference on Biogenic Amines, University of Ottawa; "Dopamine Metabolism in Human Brain under Normal and Pathological Conditions," Clinical Research Institute of Montreal, Pfizer Lecture; "Dopamine and the Basal Ganglia: Neurochemical and Clinical Aspects," Toronto Neurological Society; "Brain Dopamine and Parkinsonism," Woodruff Medical Center of Emory University, Atlanta, Georgia; "Neurochemistry and Pharmacology of Parkinsonism," Abbott Laboratories, Scientific Divisions, North Chicago, Illinois; "Brain Amines and Basal Ganglia Disease," Department of Pharmacology, University of Chicago.

Professor R. C. A. Hunter, "The Two Faces of Contemporary Psychiatry," Academy of Medicine, Toronto; "Psychiatry and the Integrated Curriculum," Wellington County Medical Association, Guelph.

Dr. J. W. Mohr, "Victimology," Osgoode Hall Law School, Toronto; "Empirical Categories in the Legal Process," Faculty of Law, Queen's University, Kingston; "Victimology with special reference to Homicide," Centre of Criminology, University of Toronto; "Reality Therapy in Probation Casework," Probation Officers Association, Toronto.

Professor Q. Rae-Grant, "The Community's Responsibility for the Mental Health of its Children," Reiss-Davis Child Study Center, Los Angeles, California; "The Adolescent Today," Ontario Psychiatric Association Meeting.

Dr. V. Rakoff, "Continuity of Violence from Generation to Generation," American Criminological Society, Toronto; "Predictions Concerning Outcome and Process of Conjoint Family Therapy," American Orthopsychiatric Meeting, New York.

Dr. P. D. Steinhauer, "Some Aspects of Child Care Worker Training," Laidlaw Foundation Symposium on Training in Child Care Work, Montebello, Quebec; "The Group Home—How therapeutic is it and how can it be more therapeutic?" Ontario Psychiatric Association.

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——— "Priorities" (*Canadian Psychiatric Association Journal*, vol. 13, no. 4, Aug. 1968, pp. 291–2).

——— "Therapeutic Paradox" (*ibid.*, vol. 14, no. 3, June 1969, pp. 287–93).

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——— "John Seeley: Poet and Revolutionary" (*Canada's Mental Health*, vol. 18, no. 3, Nov.–Dec. 1968, pp. 33–6).
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HAVELKOVA, M. "Psychiatry and the Pre-school Age Child" (*Canadian Psychiatric Association Journal*, vol. 13, no. 4, Aug. 1968, pp. 327–34).
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RADIOLOGY

Under the direction of Professor R. Brian Holmes

During the year the final planning has been completed for the involvement of the Department in the Period III curriculum, including the elective programme. Planning for Period II has also continued but not to a definitive stage. There is presently some concern as to whether there is sufficient manpower in the Department to mount the programme in a satisfactory manner.

The postgraduate training programme continues to be under review and is modified from time to time. Representatives of the postgraduate students have a place on the Department's committee on postgraduate training, where their opinions can be stated directly. The Diploma course in Therapeutic Radiology was re-organized during the year with special introductory courses being established and added seminars in Radiotherapy and Physics.

The mammography training programme for practising radiologists and radiological technicians has come into being and is centered at the Toronto Western Hospital under Drs. D. V. McFarlane and K. P. Vassal. Several months' experience indicates that this is going to become a successful continuing education venture.

At several of the hospitals new construction is either under way or has been completed. The major expansion of the Department in the Hospital for Sick Children is proceeding in the "Elm Street Wing." The Department at the Princess Margaret Hospital has just moved into new and expanded facilities, approximately three times the size of the original department. Renovation of the portion of the Department at the Toronto General Hospital, it is hoped, will result in improved patient-handling ability as well as processing, interpretation, and consultation of examinations referred to the Department.

The academic activities in general have expanded in a satisfactory manner.

Dr. M. E. Forbes, Radiologist-in-Chief at the Women's College Hospital, was appointed to the University Faculty.

During the year, the Department of Diagnostic Radiology was honoured by visits from the following distinguished radiologists: Professor D. E. S. Palmer, University of Pennsylvania; Professor Richard H. Greenspan, University of California; Dr. John Walker, Leicester, England; Dr. John K. Miller, Adelaide, South Australia; Professor Eric N. C. Milne, Harvard University, Boston; Professor Walter E. Berdon, Columbia-Presbyterian Medical School, New York; Professor A. Lalli, University of Michigan; Dr. Berkeley Zinn, Buffalo.

RESEARCH

Dr. J. E. Campbell has completed his review of all clinical and radiographic data on patients with prolonged partial obstruction of the ureter in order to assess the clinical status and the degree of, or absence of, renal atrophy and its progression over a period of twenty years' time. He has also concluded studies on all cases of adult polycystic kidney from Christie Street Hospital and Sunnybrook Hospital since 1939.

Dr. A. F. Colantonio is carrying out research on the relationship of mucosal striations in the renal pelvis and ureter to chronic pyelonephritis and, along with Dr. B. J. Reilly, on radiographic cranial manifestations of hypocalcemic convulsive rickets with differentiation from changes occurring in cases of increased intracranial pressure presenting with convulsions.

Dr. R. F. Colapinto is involved in studies of angiography in primary liver tumours and of phased R-wave injections in thoracic aortography. He has completed his research with Drs. N. T. McPhedran and R. Holiday, Department of Surgery, on strangulating bowel obstruction in dogs by means of serial superior mesenteric arteriograms.

Dr. J. W. Davidson is investigating the radiographic potentialities of transverse axial tomography. He is also continuing his study on the role of lymphography in clinical staging of malignant lymphomas. Radiological studies have now been completed on (1) comparison of ultra-fluid Lipiodol with and without 0.87 per cent chlorophyll; (2) the effects of radiotherapy on the response of the lung to intravascular ultra-fluid Lipiodol; and (3) radiographic parameters of acromegaly.

Dr. J. H. Gardiner is reviewing the radiographic findings in patients who have undergone heart or kidney transplantation and is continuing his research on the assessment of cine radiographic examinations of the temporomandibular joint in cases of suspected disc abnormality. In association with the Departments of Medicine and Orthopaedic Surgery of the Toronto Western Hospital, he has carried out a clinical and venographic study of deep venous thrombosis following hip fractures, as well as a study of the effect of anticoagulants on venous thrombosis following hip fracture.

A radiological-pathological review of primary Crohn's disease of the colon, autopsy studies on haustral fold patterns, and *in vivo* and specimen correlation of arteriographic patterns in the colon is being continued by Dr. J. Halls.

Continuation of studies of a twenty-year follow-up on ankylosing spondylitis and a long-term follow-up on multiple epiphyseal dysplasia are being carried out by Dr. J. N. Harvie with Dr. Hugh Little, Department of Medicine.

Dr. D. C. F. Harwood-Nash is doing research on the following projects: (1) With Drs. H. J. Hoffman, E. B. Hendrick, and L. A. Lloyd, Departments of Neurosurgery and Ophthalmology, tomography of the optic canal in its longitudinal axis with and without air in chiasmatic cisterns; (2) with Dr. H. J. Hoffman, Department of Neurosurgery, infantile abscesses; (3) with Dr. H. Schutz, Department of Neurosurgery, spinal cord tumours in children; (4) supratentorial tumours in children. He has concluded his studies on fracture of the petrous bone in children, the cerebrogram and, with Dr. H. Thompson, Department of Surgery, the marking of the fractured hamulus in the repair of cleft palate.

Dr. R. B. Holmes, in conjunction with Dr. K. W. Taylor, Department of Medical Biophysics, has completed the assessment of the values and limitations of the Image Isocon tube in Diagnostic Radiology.

New research projects are being undertaken by Dr. A. Humphry on small bowel intussusception, on studies of reversible bronchiectasis, and, with Dr. B. J. Reilly, on studies on the sequelae of $BaSO_4$ bronchograms, especially with respect to (1) time required for its disappearance and (2) complications.

Dr. H. T. G. Ma is involved in studies of (*a*) the change in tracheal diameter with changes in age and disease, (*b*) tracheobronchomegaly by cine radiography,

(*c*) the pleuro-esophageal stripe, (*d*) laryngeal cord paralysis by radiography, (*e*) complications following lung biopsy with the high-speed air drill, (*f*) comparison of oily and aqueous Dionosil in bronchography, and (*g*) changes following mediastinoscopy by radiography with Dr. D. W. Swales.

Dr. P. McDonald is studying the significance of changes in the chest radiograph in acute glomerulonephritis, genito-urinary tumours, and angiography in retroperitoneal tumours in children, as well as, with Dr. S. Corkery, Research Institute, Hospital for Sick Children, liver transplantation in the pig by angiographic studies of the vascular anastomoses in the aorta, vena cava, and portal vein.

Drs. D. V. McFarlane and K. P. Vassal are studying radiographic implications of skin thickness in mammary carcinoma.

Dr. R. M. Parrish, with Dr. R. Henderson, Department of Surgery, is carrying out manometric and radiological correlations in esophageal disease. He is also pursuing his investigation of the post-operative assessment following hiatus hernia repair.

Dr. B. J. Reilly has completed the following projects: (1) a clinical trial using "Isopaque-300" in intravenous pyelography; (2) gas in the intestinal wall and portal venous system in infants; (3) with Drs. H. Levison, E. A. Featherby, T.-R. Weng, L. Linsao, and P. R. Swyer (the Research Institute), pulmonary function 6–8 years after recovery from respiratory distress syndrome; (4) with Drs. H. Levison, E. A. Featherby, T.-R. Weng, and N. Aspin (the Research Institute), pulmonary function in cystic fibrosis; (5) with Drs. M. McC. Reid and P. R. Swyer (the Research Institute), cardiomegaly and pulmonary oedema in neonatal hypoglycemia. Doctor Reilly is continuing the osteomyelitis study with Dr. W. Bobechko, Orthopaedic Service, and Drs. P. Fleming and S. Huda, Department of Bacteriology, Hospital for Sick Children, and is also involved in a new project on heredofamilial abnormalities in mucopolysaccharide excretion associated with skeletal defect with Dr. J. A. Lowden (the Research Institute).

Studies are being continued by Dr. H. E. Meema, in association with the Departments of Medicine, Surgery (Orthopaedics) and Pathology, Toronto Western Hospital, on bone mineral content of the radius in hormone-dependent conditions, including malignant disease.

Dr. C. A. F. Moes is collaborating with Dr. J. Burrington, Department of Surgery, in the study of aortography in investigation of abdominal masses in infancy and childhood and, with Dr. T. Izukawa, Department of Cardiology, in the demonstration by angiocardiography of a right atrial bump in cases of tricuspid atresia. He is continuing his investigation of the types of arterial septal defects demonstrated angiocardiologically and also, with Dr. R. M. Shaher, Department of Cardiology, his studies into the radiological and angiocardiologic features of a double-outlet right ventricle.

Dr. D. F. Rideout is doing research on mammographic studies in the remaining breast following radical mastectomy for carcinoma and, with Dr. W. Rider, on staging of laryngeal carcinomas by tomography.

Dr. D. E. Sanders is pursuing further the projects on (1) the evaluation of long-term effects of smoking in women with Dr. C. R. Woolf, Department of Medicine and his staff; (2) investigation and treatment in pulmonary emphysema with Drs. C. R. Woolf, D. E. Wood, Department of Medicine, N. C. Delarue and F. G. Pearson, Department of Surgery; and (3) the application of transthoracic aspiration needle biopsy in localized intrathoracic disease with Drs. N. C. Delarue, F. G. Pearson, Department of Surgery, and D. W. Thompson, Department of Pathology.

Dr. P. C. Thorfinnson is carrying out an investigation to test the validity of recently published reports which state that peristaltic abnormality in the esophagus induced by a mixture of hydrochloric acid and barium will accurately distinguish between chest pain due to esophagitis and chest pain from other causes.

With Dr. V. S. Dayal, Department of Otolaryngology, Dr. G. Wortzman is studying the audiometric and radiological assessment of deaf children.

Members of the Department of Radiotherapy are participating in the following clinical and laboratory research projects supported by the Ontario Cancer Treatment and Research Foundation:

(1) *Clinical Investigations*: (*a*) The value of pre-operative radiation in operable carcinoma of the rectum (Dr. W. D. Rider). (*b*) The investigation of the value of fractionation in the treatment of patients suffering from glioblastoma multiforme. This study has been completed this year (Dr. W. J. K. Simpson). (*c*) A study of the value of combined therapy with B.C.N.U. and radiation therapy for patients with glioblastoma multiforme (Dr. W. J. K. Simpson). (*d*) The investigation of whether or not radiation influences the survival of patients with intracranial gliomas and craniopharyngiomas (Dr. W. J. K. Simpson). (*e*) In co-operation with various centres in the United States, a study is being continued on the value of local versus regional radiation therapy in early Hodgkin's disease (Drs. M. V. Peters, P. J. Fitzpatrick, R. M. Clark and R. S. Bush). (*f*) As a result of a retrospective study in which survival was related to haemoglobin in cancer of the cervix, a prospective study to investigate this relationship continues (Drs. R. D. T. Jenkin, W. E. C. Allt, F. A. Beale, and R. S. Bush). (*g*) The evaluation and development of the uses of computers in radiation therapy is continuing (Dr. W. D. Rider). (*h*) The prospective study of the value of prophylatic oophorectomy with or without prednisone is still being completed (all Radiotherapy staff). (*i*) Ewing sarcoma is being investigated from the standpoint of the place of whole body radiation in its management (Drs. R. D. T. Jenkin and W. D. Rider). (*j*) The value of tourniquet anoxia as an aid to radiation therapy in control of malignancies of the limbs is still being studied (Dr. W. E. C. Allt).

2. *Laboratory Studies*: (*a*) The study in detail of the construction and use of oxygen micro-electrodes (Dr. R. S. Bush). (*b*) The investigation of the development of radiation resistant populations of cells in experimental solid tumours (Dr. R. S. Bush).

HONOURS

Clifford L. Ash was awarded Fellow of Faculty of Radiologists, London, England.

R. B. Holmes was re-elected Treasurer and Director of Radiological Society of North America.

M. V. Peters was elected 2nd Vice-President, American Radium Society.

During the past year a group of Professor Holmes's former Residents inaugurated the Holmes Society, the purposes of which are to extend and continue the educational experience by an annual scientific meeting, which would be contributed to by the members, as well as by a renowned guest lecturer. The speaker at the inaugural meeting was Professor Philip Palmer, formerly of Cape Town, the radiologist involved in the original heart transplant operations.

SCHOLARLY ADDRESSES

During the year 1968–69, in addition to routine duties, members of the staff gave lectures and papers to other than local groups, as follows:

R. Blend, "Neuroradiology in Ophthalmology," Congress on Neuro-ophthamology, Toronto.

R. S. Bush, "Primary Lymphoma of the G.I. Tract," Radiological Society of North America, Chicago.

J. E. Campbell, Visiting lecturer to the University of Kentucky: (a) "Calyceal Papillary Disease Differential Diagnosis"; (b) "Dynamics of the Upper Urinary Tract"; (c) "Renal Osteodystrophy Before and After Renal Transplantation"; "Prolonged Partial Obstruction of the Ureter with Little Evidence of Renal Atrophy,"

Canadian Association of Radiologists. Visiting lecturer at the Postgraduate Course of the Royal Victoria Hospital, Montreal—"Recent Advances in Nephrology and Urology": (a) "Radiological Investigation of Renal Hypertension"; (b) "Intravenous Urogram in Urinary Tract Infection"; (c) "Two small renal workshops in renal radiology." "Pyelonephritis and Other Calyceal Papillary Diseases," Toronto Society of Nephrology. "The Physiology of the Urinary Tract," Ontario Society of Radiological Technicians Annual Refresher Course.

R. F. C. Colapinto, "Abdominal Angiography," Scarborough Hospital Seminar.

J. W. Davidson, "Patterns of Progression of Malignant Disease in the Lymph System," Royal College of Physicians and Surgeons of Canada, Vancouver, B.C. "Technique and Application of Lymphography," Queen's University, Kingston, Ontario.

D. C. F. Harwood-Nash, "The Significance of Skull Fractures in 1,187 Children," American Society of Neuroradiology, New Orleans. "Fractures of the Petrous and Tympanic Bones in Children," American Association of Neurosurgeons and American Society of Neuroradiologists, Cleveland, Ohio.

R. D. T. Jenkin, "Primary Gastrointestinal Tract Lymphoma in Childhood," Radiological Society of North America. "Whole Body Irradiation—Clinical Sequelae and Treatment," Lecture to Service M.D.'s on Biological Warfare Course, Camp Borden. "Management of Wilms' Tumour," Canadian Association of Radiologists, Vancouver, B.C.

J. L. McIytyre, "Third Dimension of the Pituitary Fossa," Canadian Association of Radiologists, Vancouver, B.C.

D. L. McRae, "Bony Anomalies at the Cranio-Spinal Junction," Congress of Neurological Surgeons, Toronto. "The Role of Radiology in the Management of the Epileptic Patient," 1969 Gordon Richards Memorial Lecture of the Canadian Association of Radiologists, Vancouver. Visiting lecturer at the Postgraduate Course in Neuroradiology at the Columbia University Presbyterian Hospital Medical Centre: (a) "Radiological Anatomy of the Skull"; (b) "The Significance of Anomalies at the Cranio-Vertebral Junction."

H. T. G. Ma, "Radiological Diagnosis of Emphysema, "The Ontario Thoracic Society, Toronto.

C. A. F. Moes, "Angiocardiographic Features of Double Outlet Right Ventricle," 54th Annual Meeting of the Radiological Society of North America, Chicago, Illinois. "Angiocardiographic Features of heart disease in the first year of life," presented at The Albany Medical Center Hospital, Albany, New York.

M. V. Peters, "Effect of Pregnancy on Breast Cancer," Welsh National School of Medicine, Wales. "Radiotherapy in Hodgkin's Disease," Memorial Hospital for Cancer and Allied Diseases, New York. "Radiation Therapy in the Management of Breast Cancer," Sixth National Cancer Conference, Denver. "The Role of Excisional Biopsy and Radiation in Early Breast Cancer," Symposium on Breast Cancer, Houston. "The Treatment of Lymphomas Related to the Natural Course of the Disease," College of Physicians and Surgeons of Columbia University, New York.

B. J. Reilly, Guest speaker at the Kitchener Academy of Medicine: "The Differential Diagnosis of Neonatal Respiratory Distress." (Discussant) "Congenital Dislocation of the Hip," Canadian Association of Radiologists, Vancouver. "Pulmonary and Abdominal Emergencies in the Newborn—Radiological Assessment," Scarborough General Hospital Seminar.

D. E. Sanders, "Radiological Aspects of Parasitic Diseases of the Lung," First all-Canadian Meeting of Tropical and Parasitic Diseases and Health, Academy of Medicine, Toronto. "Cinebronchography and Bronchial Dynamics," Ontario Thoracic Society, Toronto and Visiting Professor to Yale University School of Medicine, New Haven.

G. Wortzman, "Radiological Aspects of Cysticercosis," First all-Canadian Meeting of Tropical and Parasitic Diseases and Health, Academy of Medicine, Toronto.

PUBLICATIONS

ALLT, W. E. C. "Supervoltage Radiation Treatment in Advanced Cancer of the Uterine Cervix" (*Canadian Medical Association Journal*, vol. 100, no. 17, May 3, 1969, pp. 792–7).

COLAPINTO, R. F. "Arteriography in the Diagnosis of Liver Tumours" (*Canadian Medical Association Journal*, vol. 99, no. 24, Dec. 21, 1968, pp. 1175–85).

DAVIDSON, J. W. "Lipid Embolism to the Brain following Lymphography: Case Report and Experimental Study" (*American Journal of Roentgenology*, vol. 105, no. 4, April 1969, pp. 763–71).

DAVIDSON, J. W. *et al.* "The Current Status of Lymphography at the Ontario Cancer Institute" (*Clinical Radiology*, vol. 20, no. 1, Jan. 1969, pp. 32–9).

——— "Influence of Modern Radiological Techniques on Clinical Staging of Malignant Lymphomas" (*Canadian Medical Association Journal*, vol. 99, no. 24, Dec. 21, 1968, pp. 1196–1204).

——— "Radiographic Findings in 'Burkitt Type' Lymphoma" (*Journal of the Canadian Association of Radiologists*, vol. 19, no. 3, Sept. 1968, pp. 121–5).

FITZPATRICK, P. J. "Lymphangiosarcoma and Breast Cancer" (*Canadian Journal of Surgery*, vol. 12, no. 2, April 1969, pp. 172–7).

FITZPATRICK, P. J., and BROWN, T. C. "Angiofollicular Lymph Node Hyperplasia" (*Canadian Medical Association Journal*, vol. 99, no. 22, Dec. 28, 1968, pp. 1259–62).

HOLMES, R. B. "The 'New Look' in Radiology" (*Canadian Medical Association Journal*, vol. 99, no. 24, Dec. 21, 1968, pp. 1159–63).

JENKIN, R. D. T. *et al.* "The Influence of the Blood Pressure on Survival in Cancer of the Cervix" (*British Journal of Radiology*, vol. 41, no. 492, Dec. 1968, pp. 913–20).

LANSDOWN, E. L., ALDRIDGE, H. E., and SPRATT, E. H. "Angiographic Assessment of the Ischemic Left Ventricle: A Preliminary Report" (*Canadian Medical Association Journal*, vol. 99, no. 24, Dec. 21, 1968, pp. 1171–4).

MCINTYRE, J. L. *et al.* "Double Contrast Arthrography of the Knee" (*Radiology*, vol. 92, no. 3, March 1969, pp. 487–99).

MEEMA, H. E. *et al.* "Cortical Bone Mineral Density versus Cortical Thickness in the Diagnosis of Osteoporosis: A Roentgenologic-densitometric Study" (*Journal of the American Geriatric Society*, vol. 17, no. 2, Feb. 1969, pp. 120–41).

——— "Prevention of Postmenopausal Osteoporosis by Hormone Treatment of the Menopause" (*Canadian Medical Association Journal*, vol. 99, no. 6, Aug. 10, 1968, pp. 248–51).

MEEMA, H. E., and REID, D. B. W. "The Relationship between the Skin and Cortical Bone Thickness in Old Age with Special Reference to Osteoporosis and Diabetes Mellitus: A Roentgenographic Study" (*Journal of Gerontology*, vol. 24, no. 1, Jan. 1969, pp. 28–32).

MOES, C. A. F., GOLDMAN, B. *et al.* "Spontaneous Aneurysm of the Ductus arteriosus in Childhood" (*Journal of Thoracic and Cardiovascular Surgery*, vol. 57, no. 2, Feb. 1969, pp. 180–4).

PARRISH, R. M. "Cricopharyngeus Dysfunction and Acute Dysphagia" (*Canadian Medical Association Journal*, vol. 99, no. 24, Dec. 21, 1968, pp. 1167–71).

PEARSON, F. G., PARRISH, R. M., DRUCKER, W. R. *et al.* "Role of Vagotomy and Pyloroplasty in the Therapy of Symptomatic Hiatus Hernia" (*American Journal of Surgery*, vol. 117, no. 1, Jan. 1969, pp. 130–7).

PETERS, M. V., BROWN, T. C., DAVIDSON, J. W. *et al.* "The Value of Locating Occult Disease in the Treatment of Hodgkin's Disease"; in *Progress in Lymphology, Proceedings of the International Symposium on Lymphology*, Zürich, 1966, ed. A. Rüttimann, pp. 119–25. Stuttgart: Georg Thieme, 1968.

PETERS, M. V., HASSELBACK, R., and BROWN, T. C. "The Natural History of the Lymphomas related to the Clinical Classification"; in *Proceedings of the International Conference on Leukemia-Lymphoma*, ed. C. J. D. Zarafonetis, pp. 357–71. Philadelphia: Lea and Febiger, 1968.

PETERS, M. V., and MEAKIN, J. W. "The Effect of Pregnancy on Breast Cancer"; in *Prognostic Factors in Breast Cancer, Proceedings of First Tenovus Symposium*, Cardiff, 1967, ed. A. P. M. Forrest and P. B. Kunkler, pp. 471–506. Edinburgh: E. and S. Livingstone, 1968.

REILLY, B. J. *et al.* "The Significance of Isolated Upper Pole Calyceal Dilatation" (*Journal of the Canadian Association of Radiologists*, vol. 19, no. 4, Dec. 1968, pp. 179–82).

RIDER, W. D. "Radiotherapy in the Management of Carcinoma of the Larynx" (*Applied Therapeutics*, vol. 10, no. 3, March 1968, pp. 183–6).

RIDER, W. D. *et al.* "Some Opinions on Treatment of Cancer of the Oesophagus" (*American Journal of Roentgenology*, vol. 105, no. 3, March 1969, pp. 514–17).

SAMAD, I. A., WOOD, D., SANDERS, D. E., SUERO, J. T., and WOOLF, C. R. "A Comparison of Pulmonary Angiography and Intravenous Radioactive Albumin Lung Scanning in Chronic Obstructive Pulmonary Emphysema" (*Diseases of the Chest*, vol. 53, no. 5, May 1968, pp. 571–6).

SANDERS, D. E., PEARSON, F. G., WOOLF, C. R. *et al.* "Asymptomatic Thoracic Mass Nine Years after Operation for Aortic Coarctation" (*Diseases of the Chest*, vol. 55, no. 4, April 1969, pp. 347–8).

Sanders, D. E., and Woolf, C. R. "Cinebronchography – A study of Dynamics in Emphysema" (*Canadian Medical Association Journal*, vol. 99, no. 24, Dec. 21, 1968, pp. 1164–6).
Simpson, W. J. K. "Fractionation Study in the Radiation of Patients with Glioblastoma Multiforme" (*Revista Interamericana de Radiológica*, vol. 3, no. 2, pp. 37–42).
Wortzman, G., Barnett, H. J. M., and Lougheed, W. M. "Bilateral Internal Carotid Occlusion: A Clinical and Radiological Study" (*Canadian Medical Association Journal*, vol. 99, no. 24, Dec. 21, 1968, pp. 1186–96).
Wortzman, G., Macnab, I. *et al.* "Lumbar Discography and its Clinical Applications" (*Canadian Journal of Surgery*, vol. 11, no. 3, July 1968, pp. 280–9).

SURGERY

Under the direction of Professor W. R. Drucker

Unrest in universities is clearly the order of the day in an era characterized by challenge of all tradition. Institutions devoted to advancing knowledge have become centres of discord. University government, in the orderly pursuit of a scholarly life, has been caught in the cross-fire of sociological and technological advances. In this school a seemingly quiet, evolutionary adaptation to the forces of change has succumbed on occasion to a sense of urgency and frustration that culminated in a tyranny of personal and institutional materialism. The Department of Surgery, which must function at the interface between the University and the society which both supports it and depends upon it, is in a particularly favourable position to exercise leadership. Its past performance indicates that this Department will not be content with a purely service function but will continue to participate in the problems and perspectives of the University, its students, and faculty.

Many developments during the past year provide the basis for optimism that University and Departmental goals will be attained. The clerkship, designed to give students an increased role in the care and study of patients, started in June, 1969, and under the able direction of the Period III Coordinator, Dr. Neil Watters, faculty from all hospitals and clinical departments will present a co-ordinated programme of core material to supplement the practical experience of ward work. Urgently needed new laboratories have become available in the Medical Sciences Building. Centralization of research activity will permit interdepartmental and interdisciplinary communication and collaboration. In time this association will add strength to the educational programme, particularly in the second period that emphasizes mechanisms of disease. Unfortunately, a critical shortage of funds has curtailed the inception of an investigative programme by some young surgeons who have recently returned after training with established investigators in other centres. However, owing to the generosity of members of the Staff Associations in certain teaching hospitals, some funds have become available to purchase equipment and to underwrite the costs of new research projects. Although a more generous programme of grants in aid of research is desperately needed from the Medical Research Council and other agencies, the determination of young faculty members to persevere despite restrictions is, indeed, a cause for optimism.

The Department is both proud and saddened by the departure of Dr. N. T. McPhedran to assume the Chair of Surgery at the newly created School of Medicine in Calgary, Alberta. Dr. McPhedran has been a pillar of strength in the Department of Surgery. His new appointment reflects the universal high esteem with which he is regarded and brings credit to the University that was responsible for his education.

RESEARCH

Cardiovascular Division

The important new project in the past year was human heart transplantation. A large amount of information that could not have been obtained from animal research

has been gleaned from the clinical studies here in Toronto and elsewhere. Work at the Toronto Western Hospital has stimulated Dr. S. Sekigughi to develop an excellent tissue typing laboratory in close liaison with Dr. Terasaki of California. Combined experimental and clinical study involving members of the Department of Surgery, Medicine, and Pathology at the Toronto General Hospital of the humoral mechanism of heart rejection is being carried out. The human tissue obtained at heart transplant operations has been valuable and informative. Other new research, at the Hospital for Sick Children, deals with a study of the underdeveloped right ventricle and an important project dealing with pulmonary insufficiency as it relates to "blue babies" that have had a total correction. A new approach to the conducting mechanism of the heart is being initiated at St. Michael's Hospital.

In surgical techniques, the interesting use of open heart exposure without coronary artery circulation (anoxic arrest) is being used and studied clinically and experimentally. Pulmonary valves are being inserted in congenital heart disease and a new double internal mammary implant has been introduced successfully.

Dr. W. G. Bigelow has been working on the double internal mammary artery operation and all initial cases are to be followed with periodic catheterization. In collaboration with Dr. B. S. Goldman and Dr. John Crookston, a combined experimental and clinical approach is being made to the immunological aspects of heart transplants. Dr. R. J. Baird is continuing research on the physiology of myocardial revascularization, with special interest on developing a simple and accurate technique of measuring intramyocardial tissue pressure in the various stages of systole and diastole. His studies in the physiological processes which control the behaviour of an artery implanted in a tunnel in the myocardium continue. Dr. J. T. Hart has centred his research on myocardial revascularization, collateral circulation, wound healing, vaso vasorum, and myocardial metabolism and physiology. He is also studying the relative harm of anoxic cardiac arrest and induced electric ventricular fibrillation as techniques to stop ventricular contraction during direct coronary arterial surgery. Dr. R. O. Heimbecker has concluded his experimental work on the fate of homograft and heterograft valves in dogs and calves. His research continues on decompression sickness, experimental myocardial infarction in calves, massive pulmonary embolism, and changes in plasma red cell and extracellular fluid volume in cardiac surgery. Dr. J. A. Key's current research involves the medical and social postoperative history of his patients with symptomless aortic aneurysms. Dr. W. T. Mustard has been experimenting on a pedicle graft of the diaphragm to replace the right ventricle and pace it or use it as a myocardial revascularization following the infarction of the left ventricle with pacing, but plans to terminate this work. He is just starting experimentation on the underdeveloped right ventricle by creating a very large ventricular septal defect converting it into a single ventricle. Dr. A. S. Trimble has been working with Drs. M. Sheverini, M. Krajicek, M. Silver, and B. Goldman on the effects of anoxic arrest on myocardial function, histology, and biochemistry. This experimental study has been complemented by a clinical study. Dr. G. A. Trusler has continued his study of the fate of homograft and heterograft valves and pericardial cusps in the pulmonary area of calves. In conjunction with Dr. P. E. Conen, he has worked on electron microscopic studies of post-perfusion lung and pulmonary hypertension. This year he initiated a study of the relative effect of pulmonary insufficiency, pulmonary stenosis, and combined pulmonary insufficiency and stenosis in dogs. Dr. J. K. Y. Yao is engaged in three research projects: (1) the surgical creation of a "bundle of Kent" in the treatment of complete heart block; (2) the design and testing of an intracorporeal cardiac assist pump (with the Department of Medical Electronics); and (3) left ventricular assist in the failing heart. Dr. W. Zingg has been working on: extracorporeal circulation during open heart surgery during infancy, including the construction of a suitable membrane oxygenator; biorheology of blood, studies on the physical flow properties of blood; haemodynamic studies during shock, especially rewarming shock; and selected topics related to hypothermia.

General Surgery

Dr. D. R. Bohnen is continuing his research in the repair of large hernias, using sheets of plastic material, and is testing a new absorbable suture without irritative properties. Dr. D. J. Currie has completed a clinical investigation study on the use of large volumes of normal saline during surgical procedures with Dr. D. C. Finlayson and has also completed a study of the experience at St. Michael's Hospital of 425 cases of upper gastrointestinal tract bleeding with Dr. A. Halmagyi. Dr. Currie is continuing research into the pathogenesis of cholecystitis and cholelithiasis and has commenced a study of the clinical value and safety of continuous postoperative peritoneal lavage. Dr. W. R. Drucker has been involved in shock studies concerning: (1) the influence of infused glucose and insulin response; (2) pre-existing respiratory alkalosis on tolerance and cardiac output; (3) biological consequences of a single acute haemorrhage. Dr. E. B. Fish is involved in analysing patients with mammary dysplasia to correlate our pathological findings more clearly with their prognosis. Dr. I. H. Koven is researching the following: the clinical application of measuring extracellular fluid in surgical patients, using radioactive sulphate and Risa I^{125}; the evaluation of interstitial fluid in dogs subjected to haemorrhagic shock, using the implant basket technique; changes in extracellular fluid volume in patients undergoing open heart surgery in which the extracorporeal pump has been primed with Ringer's lactate (in collaboration with Dr. R. O. Heimbecker); the dispersion of supra-vital dyes in rats in haemorrhagic shock as an indication of changes in connective tissue ground substance; and in collaboration with Dr. W. R. Drucker, development of a rapid method for accurately measuring cardiac output in small animals using radioactive I^{125}. Dr. L. J. Mahoney is working on a study of combined active-passive immunization against tetanus being carried on in the Emergency Department of St. Michael's Hospital. Dr. R. I. Mitchell is continuing research in lung scanning as a method of detecting rejection of homotransplanted lungs. Dr. J. E. Mullens is studying gastritis—a comparison between radiological, gastroscopic and histological appearances and secretory capacity. His work also continues on a study of fluorescent antibodies in the colonic mucosa of ulcerative colitis patients. He has commenced researching the use of vascular anastomotic clamps in performing revascularized bowel transplants to replace the cervical esophagus. Dr. J. A. Palmer has completed a study of patients with hyperparathyroidism and also a study of patients treated by the Moschcowitz-Graham operation for prolapse of the rectum. Dr. H. F. Robertson continues research in H_2O_2 as a possible oxygenator and a study of the coanda effect. Dr. I. B. Rosen is presently completing a project on the induction of histological changes in the thyroid gland of rats, by dietary calcium manipulation. During the past year, Dr. R. L. Ruderman continued his research on the gastric acid production in mice by means of Heidenhain pouch collections in association with various small bowel resections. Dr. B. Shandling has embarked on a study of hepatic orthotopic homotransplantation in the pig. He is involved as well in a project investigating the problems associated with porcine liver perfusion for hepatic coma. Dr. Shandling is also researching the construction of a peritoneal prosthesis for use in porto-caval shunts in pigs.

Neurosurgical Division

The neurosurgeons of the University have joined in a co-operative controlled clinical trial of the effectiveness of radiation therapy in the treatment of certain intracranial gliomas.

Dr. J. F. R. Fleming is involved in a continuing study of intrathecal radioisotopes, and the various clinical studies whose titles are listed in the publications. He has no animal laboratory work in progress at present. Dr. E. B. Hendrick is working with Dr. H. J. Hoffman on a cortical analysis of methods and results of hydrocephalus as treated in the Hospital for Sick Children in the period 1954–69. Dr. Hoffman also continues his research into the effect of steriod therapy on Cerebral Oedema. Research in vascular spasm has been continued by Dr. W. M. Lougheed,

working with Dr. M. Ogata. He has also put the final touches on a test for investigating difficult cases of low back pain and sciatica. Dr. R. G. Vanderlinden's research activities have centred around pursuing the investigation of C-fibre activity in peripheral nerves and their central projection into the ventral tegmentum and thalamus of the brain.

Orthopaedic Division

Dr. W. P. Bobechko has been working on: immunological reactions of articular cartilage; joint transplantation; pathogenesis of osteogenesis imperfecta; leg length discrepancy following femoral shaft fracture in growing children; orthotic bracing in meningomyelocele children. Dr. R. H. N. Fielden continues his research on riding for the disabled; high-frequency pulsed radiation in the healing of fractures in pigs and a clinical study of immediate postoperative fitting of the amputee. Dr. D. A. Gibson has been conducting studies of patients with muscular dystrophy of the Duchenne variety and cervical spine fusions in children. Dr. J. E. Hall's current research activities are clinically oriented toward development of electrically controlled upper extremity prosthesis; the development of electromyography in cerebral palsy; and new principles in prosthetics and bracing. Dr. W. R. Harris continues his work on the effect of tibial osteotomy on weight bearing through the knee joint and on studies of stump-socket pressure distribution in lower extremity amputees. Dr. D. E. Hastings' research activities have been primarily directed to the clinical research into results of surgery of rheumatoid arthritis. Dr. G. J. Lloyd is involved in studies of tissue responses in the knee joint to implant homografts of costal cartilage and renal osteodystrophy. During the past year Dr. I. Macnab has undertaken the following research programmes: (1) auto-immune responses in the rotator cuff; (2) the pathogenesis of nerve root fibrosis; (3) a statistical survey of vertebral abnormalities detected on X-ray; and (4) the blood supply to the lumbar spine. Dr. G. A. McDonald has been involved in follow-up studies of rotator cuff injuries at the shoulder, and anterior inlay bone grafts for ununited fractures of the scaphoid. Dr. M. Rang has done experimental studies into the etiology of idiopathic scoliosis and clinical studies regarding scoliosis in medical diseases. Dr. R. B. Salter has done experimental investigations into Legg-Perthes' Disease in pigs; and into various intra-articular drugs and their effects on articular cartilage and synovial membrane. His clinical investigations have involved: the results of innominate osteotomy in the treatment of Legg-Perthes' Disease in children; the epidemiology of monarticular synovitis in the hip; and the first ten years personal experience with innominate osteotomy in the treatment of congenital dislocation of the hip. Dr. J. Schatzker has been engaged in: an evaluation of the currently used techniques for internal skeletal fixation; a clinical survey and follow-up of post traumatic shoulder stiffness; and an evaluation of the healing of odontoid fractures. In basic research Dr. Schatzker has concluded the following projects: (1) research on microvascular anatomy of the human odontoid; (2) research on microvascular anatomy of the canine odontoid; (3) a study on the influence of the blood supply to the odontoid in the healing of experimentally produced odontoid fractures; and (4) a study on the influence of periosteal interposition in the healing of fractures—part of an extensive project on fracture healing. Dr. E. A. Silverstein has been doing clinical research in avascular necrosis of the femoral head and its early identification, using radioactive strontium uptake techniques. Dr. E. H. Simmons has conducted the following in the past year: (1) an experimental investigation of cryosurgery in the treatment of malignant disease of bone and soft tissue; (2) a study of the effect of regional hypothermia on the prevention of ischemic morbidity on operative human limbs under tourniquet; (3) the effect of Heparin on tumour metastasis using vx2 carcinoma in rabbits; and (4) a biomechanical and clinical investigation of anterior spinal instrumentation. Dr. A. M. Wiley continues his projects on: venographic studies on the lower limbs following fractures; homotransplantation of hyaline cartilage and rejection phenomena; and a microstudy

of skeletal changes following renal dialysis. Dr. T. A. Wright's research this year has been involved with the examination of the synovium of the joint of a dog following synovectomy with reference to early postoperative movement and delayed post-operative movement.

Plastic Surgery Division

In the past year Dr. H. G. Thomson was involved in the following clinical research: three dimensional investigation and programming in treatment of facial deformities; pigment colour match for surgical tattooing naevus flammeus; fate of bathtub burned patients; management of dog-bites to the face; and palatal growth studies after push-back palatoplasty and hamulus infracture. His basic research has centred upon investigation of skin graft hyperpigmentation and melanogenesis and topography of mixed motor and sensory nerves in the wrist and results of surgical repair. Dr. W. K. Lindsay has conducted clinical research on studies on the use of the Barrier Nursing Unit, or patient isolator system, in the treatment of the burned patient in conjunction with the Department of Bacteriology of the Hospital for Sick Children. His basic research has centred upon collagen and mucopolysaccharide metabolism in normal and healing tendons. Dr. G. H. Knutson is continuing to compile a series on flexor tendon injuries to ascertain the results obtained from different methods of treatment. Dr. J. R. Birch has done clinical research on: the effect of increased ambient temperature and decreased ambient humidity on burn wound healing and morbidity; and the use of homografts in the treatment of fresh thermal burns of partial and full thickness. His basic research, being carried out on rats, is a study entitled, "The Effect of Ambient Temperature and Humidity on the Metabolic Rate and the Rate of Healing of a Burn."

Thoracic Surgery Division

The Thoracic Service has continued with its detailed prospective analysis of tracheal injury following cuffed tube tracheostomy on all patients in the Respiratory Failure Unit. This study continues to provide useful information relating to both prophylaxis and diagnosis. A number of retrospective clinical studies are underway: (1) a review of a 25-year experience at T.G.H. with primary tumours of the trachea; (2) long-term retrospective analysis of patients with thyoma, Schatzki's ring.

Dr. F. G. Pearson has been continuing his research on the bronchial arterial circulation in lung transplantation in the dog. His clinical investigation is concerned with a prospective analysis of tracheal injury following cuffed tube tracheostomy in all patients entering the Respiratory Failure Unit at the Toronto General Hospital.

Urology Division

Dr. G. T. Cook has continued to study the effect of vasodilators on perfusion of the canine kidney. Dr. P. O. Crassweller's research activity has revolved around tissue culture studies in carcinoma of the bladder, attempting to prove the thesis that recurrence of papillary bladder tumours is in many instances due to implanted cells occurring at the time of resection. Dr. G. L. Gale has been engaged in a further survey of 1,000 cases of genito-urinary tuberculosis. Dr. A. G. Keresteci's research activities have included: indwelling catheters and urinary tract infection; endoscopic photography of bladder lesions; and the osmolarity and sodium content of urines of recurrent stone formers. Dr. P. G. Klotz has just commenced studies on the role of viral infections in bacterial urinary tract infection and on the relationship of small numbers of bacteria in the prostate, acting as a focus for urinary tract infection. Dr. J. T. Rankin has commenced an assessment of outflow tract obstruction by pressure and flow measurements in recurrent cystitis, and a clinical assessment of implanted electronic stimulators in urinary incontinence. Dr. C. J. Robson is continuing research in conjunction with the Department of Bio-medical Electronics on electronic stimulation of the denervated bladder.

HONOURS

Dr. R. J. Baird, Medal in Surgery, Royal College of Physicians and Surgeons of Canada.

Dr. W. G. Bigelow, Vice-President, Canadian Cardiovascular Society; Member, Defence Research Board; Co-Chairman of Annual Giving, Brandon University; Board of Directors, Ontario Heart Foundation; Highly Specialized Services Committee, Department of Public Health of Ontario.

Dr. W. P. Bobechko, George Armstrong Peters Prize in Surgery, 1968.

Dr. D. R. Bohnen, President, Academy of Medicine, Toronto.

Dr. N. C. Delarue, Honorary Membership, Canadian Red Cross Society.

Dr. W. R. Drucker, Panel Moderator, Postgraduate Course on the Pathophysiology of Trauma; James Starr Simpson Memorial Lecturer, St. Joseph's Hospital, Toronto; Guest lecturer, University of Pittsburgh; Visiting Professor, Washington University; Visiting Professor, Kettering Medical Center, Ohio; Visiting Professor, Akron City Hospital, Ohio; Centennial Professor, Prince Henry's Hospital, Monash University, Melbourne, Australia.

Dr. D. E. Hastings, Chairman, Editorial Sub-Committee for the Dewar Club Volume of the Canadian Journal of Surgery.

Dr. E. B. Hendrick, Neurosurgeon-in-Chief, Pro. Tem., Children's Medical Center, Boston.

Dr. H. J. Hoffman, Connell Visiting Professor, Neurosurgery, Queen's University.

Dr. J. A. Key, Secretary-Treasurer, Canadian Federation of Cardio-Vascular and Thoracic Surgeons.

Dr. W. K. Lindsay, Vice-President, American Association of Plastic Surgeons.

Dr. W. M. Lougheed, Visiting Lecturer, Watson Clinic, Florida; Visiting Professor, University of Oklahoma Medical Center.

Dr. I. Macnab, Visiting Professorships: South African Orthopaedic Association; Columbia University, New York; University of Texas; Emory University, Georgia. Guest Lecturer, University of Montreal.

Dr. C. J. Robson, Visiting Professorships: University of California, and University of Buffalo. Guest Lecturer, Texas and Louisiana Urological Society; Rathbun Memorial Lecturer, New York City. President, Canadian Urological Society.

Dr. R. B. Salter, Visiting Professorships: University of Hong Kong, University of Puerto Rico, University of Washington; Guest Lectureships: Tokyo University, University of Singapore, University of Mexico, University of Pittsburgh, Oxford University, Georgetown University, and University of Oregon; John F. LeCocq Lecturer, University of Washington.

Dr. E. H. Simmons, President, Canadian Orthopaedic Research Society; Guest speaker, Western Pacific Orthopaedic Association, Hong Kong; Visiting Orthopoedic Surgeon, Harvard Medical School; Guest Speaker, University of Calgary.

Dr. H. G. Thomson, Vice-President, OMA Section of Plastic Surgery; Examiner, Royal College of Surgeons of Canada; Treasurer, Ontario Crippled Children's Centre; Secretary, International Alpine Surgical Society.

Dr. W. Zingg, Honors Achievement Award, Angiology Research Foundation, The Purdue Frederick Company.

SCHOLARLY ADDRESSES

Dr. W. G. Bigelow, The John Keith Lecture, Canadian Cardiovascular Society; "Status of Heart Transplantation, Recent Developments in Cardiology," sponsored by the Ontario Heart Foundation; International Symposium on Prosthetic Valves, National Institute of Welfare, Madrid, Spain; Guest Speaker, Manitoba Medical Association, Winnipeg.

Dr. G. T. Cook, "Urinary Obstruction" and "Urinary Infection in Children"

to the Postgraduate Course in Surgery, U. of T.; "Dead or Alive," Course for Coroners; "Kidney Transplantation," "Tumour of Urinary Tract," and "Common Genito-Urinary Problems," Postgraduate Course in Genito-Urinary System, U. of T.; Moderator of panel, "Kidney Transplantation," for the Surgical Alumni Association, Hospital for Sick Children; "Kidney Transplants," Scopus; "Kidney Transplants," Association of Medical Secretaries; "Kidney Transplants," Ontario Dialysis Association; "Bladder Cancer," Ontario Medical Association; "Sarcoma of Prostate," Canadian Urological Association.

Dr. W. R. Drucker, "Metabolic Response to Injury," "Shock—Etiologic Diagnosis and Management," and "Regional Enteritis," Kansas City Southwest Clinical Society; "Pre-existing Respiratory Alkalosis on Tolerance for Hemorrhagic Shock," University of Pittsburg Surgical Biology Club II; "Metabolic Response to Injury," American College of Surgeons; "Altered Body Physiology due to Bed Rest," Postgraduate Course on Pathophysiology, Memphis; "Postoperative Nitrogen Catabolism latrogenic or Inevitable," Washington University; "Use and Abuse of Drugs in the Treatment of Shock," U. of T. Postgraduate Refresher Course; "Two-Team Abdominal Perineal Resection for Ulcerative Colitis," American College of Surgeons Sectional Meeting; "Biology of Medical Education" and "Factors Inducing Tolerance to Hypovolemic Shock," Kettering Medical Center, Ohio; "Factors Inducing Tolerance for Hypovolemic Shock" and "Biology of Medical Education," Akron City Hospital, Ohio; "Shock," Academy of Medicine, Ottawa and Department of National Defence; "Effect on Water & Salt Metabolism in Shock," University of Illinois; As Centennial Professor in Australia: "Medical Education in the Age of Apollo," "Inhibitions in the Education of a Clinical Scientist," "Pancreatic Endocrine Activity after Prolonged Shock," "Role of Public Relations in North American Hospitals," "Postoperative Nitrogen Catabolism Iatrogenic or Inevitable," "Consequences of the Western Reserve Experiment in Medical Education," "Metabolic Aspects of Haemorrhagic Shock," "Physiology and Pathophysiology of Gastrointestinal Fluids," "Regional Enteritis, Ulcerative Colitis," "Management of the Shocked Patient."

Dr. R. H. N. Fielden, "Immediate Postoperative Fitting of the Amputee," for the Canadian Association of Prosthetists and Orthotists (Introductory Lecture); "Immediate Fitting of the Lower Extremity Amputee," Orthopaedic Instructional Course, U. of T.

Dr. J. F. R. Fleming, "CSF Scanning," University of Michigan Medical School; "Trauma to the Visual Pathway," Toronto Postgraduate Course on Neuro-ophthalmology; "Angiographic Assessment of Carotid Endarterectomy," Canadian Congress of Neurological Sciences.

Dr. D. A. Gibson, The Mead Johnson Lecture, College of General Practice, Charlottetown.

Dr. B. Goldman, "Current Progress in Organ Transplantation," Rho Rho Phi Pharmaceutical Fraternity; "Recent Progress in Cardiac Surgery," Florence Nightingale School of Nursing; "Organ Transplantation—Medical, Legal, Moral and Religious Aspects," Panel discussion, Jewish Public Library; "Cardiac Transplantation," Canadian Association for Laboratory Animal Science; "Human Cardiac Transplantation," Toronto Academy of Veterinary Medicine; "The Contribution of Internal Mammary Implant to Total Coronary Blood Flow and Left Ventricular Function," Section of Cardiology, Academy of Medicine.

Dr. J. E. Hall, "Osteomyelitis" and "Septic Arthritis" and "Scoliosis" and "Congenital Dislocation of the Hip," University of Southern California.

Dr. R. O. Heimbecker, "Surgical Treatment of Coronary Artery Disease," Columbia College of Physicians & Surgeons; "Thrombo-Embolism" & "Cardiac Arrest," U. of T. Postgraduate Course; "Recent Advances in Surgery of Coronary Artery Disease," Guelph and District Medical Association; "Aggressive Management of Acute Myocardial Infarction," American College of Cardiology; "Surgical Treatment of Cardiac Disease," Oakville Hospital and District Medical Association;

"Progress of Cardiac Transplantation," Wellesley Hospital Women's Auxilliary; "The Present Status of Cardiac Transplantation," Central Hospital, Toronto; "Role of Gas Embolism in Decompression Sickness—A New Look at the Bends," Royal College of Physicians and Surgeons; "Myocardial Infarction," Society of Thoracic Surgeons; "Tissue and Organ Transplantation," Otolaryngology Staff, U. of T.; "Infarctectomy," American College of Physicians; "Research of Acute Myocardial Infarction," U.S. Department of Health and Welfare.

Dr. E. B. Hendrick, "Hemispherectomy," Congress of Neurological Surgeons; "Spinal Cord Tumours in Children," American Academy of Neurological Surgery; "Optic Nerve Gliomas," Neuro-ophthalmology Course, U. of T.

Dr. H. J. Hoffman, "Brain Abscesses in Early Infancy," Harvey Cushing Society.

Dr. A. G. Keresteci, "Post-Radiation Bladder and Its Management," Interurban Surgical Society Meeting; "Prebreathing of Oxygen with Radiotherapy of Bladder Tumours," International Alpine Surgical Society Meeting.

Dr. P. G. Klotz, "Ureteral Reflex in Adults," American Urologic Association; "Runyon's Bacteria in the Urine," Canadian Urological Association.

Dr. I. H. Koven, "Hyponatremic Encephalophathy" and "The Use of Balanced Salt Solutions in Major Operations," Royal College of Physicians and Surgeons of Canada.

Dr. K. E. Livingston, "Twenty Years After—The Limbic System Revisited," Lahey Clinic, Boston; "Central Modulation of Autonomic Outflow," Society of Neurologic Surgeons; "Central Modulation of Autonomic Activity," American Association of Neurologic Surgeons; "The Limbic Lobes," Academy of Medicine, Toronto; "Cerebellar Modulation of the Cardio-Inhibitory Reflex," Federation Meetings—Atlantic City.

Dr. G. J. Lloyd, "Skeletal Changes in Patients on Long-term Renal Dialysis," Dewar Club, Toronto Western Hospital; "Renal Osteodystrophy," Ontario Dialysis Association Meeting; "Studies in Tissue Responses in the Knee Joint to Implant Homografts of Costal Cartilage—a continuing study," The Research Division of The Canadian Orthopaedic Association.

Dr. I. Macnab, "Management of Painful Spondylolisthesis," American Academy of Orthopaedic Surgeons; "Failures of Spinal Surgery," Fremont Chandler Memorial Lecture, Chicago.

Dr. T. P. Morley, "The Failure of Radiation Therapy to Improve the Survival Period of Intracranial Gliomas," Joint Meeting of Society of British Neurological Surgeons and Portuguese-Spanish Society of Neurosurgery; "Giant Intracranial Aneurysms," Congress of Neurological Surgeons.

Dr. J. E. Mullens, "Carcinoma of the Esophagus," Quebec Surgical Association and the Janes Surgical Society; "Carcinoma of the Esophagus," Academy of Medicine, Toronto.

Dr. F. G. Pearson, "Colon Interposition—Belsey Technique," American College of Surgeons; "The Surgical Management of Peptic Oesophagitis," Academy of Medicine, Toronto; "An Operative Technique for the Prevention of Reflux Following Oeophagogastrostomy," Canadian Association of Gastroenterologists; "Oesophageal Replacement for Peptic Stricture: Colon Replacement and Gastroplasty," The Kergin Surgical Society; "An Operative Technique for the Control of Reflex after Oesophagogastrostomy," American Association for Thoracic Surgery.

Dr. M. Rang, "The Pathogenesis of Perthes Disease," Academy of Medicine, Toronto.

Dr. J. T. Rankin, "Cryosurgical Prostatectomy," Belgian Urological Association.

Dr. C. J. Robson, "The Results of Radical Nephrectomy for Renal Cell Carcinoma," American Association of Genito-Urinary Surgeons; "Thoraco-abdominal Nephrectomy," Clinical Congress, American College of Surgeons.

Dr. E. A. Silverstein, "Central Fracture-Dislocations of the Hip," Dewar Orthopaedic Club.

Dr. E. H. Simmons, "The Surgical Correction of Flexion Deformity of the Cervical Spine in Ankylosing Spondylitis," Canadian Orthopaedic Association; "An Experimental Investigation of Cryosurgery in the Treatment of Neoplasms of Bone and Soft Tissue," Canadian Orthopaedic Research Society; "Atlanto-axial Arthrodesis by the Gallie Technique" and "Anterior Cervical Discectomy and Fusion—A Clinical and Biomechanical Study," the Western Pacific Orthopaedic Association; "The Surgical Correction of Flexion Deformity of the Cervical Spine in Ankylosing Spondylitis," University of Hong Kong; "Anterior Cervical Discectomy and Fusion—A clinical and biomechanical study," Biennial Congress of the International College of Surgeons; "The Surgical Correction of Flexion Deformity of the Cervical Spine in Ankylosing Spondylitis," Royal College of Surgeons; "Acute Dislocation of the Acromioclavicular Joint," Rocky Mountain Traumatological Society; "An Analysis of Fractures and Fracture Dislocations about the Elbow Joint," "The Treatment of Acromioclavicular Dislocation," "Acute Volkmann's Ischemia in Association with Fractures," and "Deceleration-Extension Injuries of the Cervical Spine," Department of Orthopaedic Surgery, University of British Columbia; "Soft Tissue Injury of the Cervical Spine,' Refresher Course, U. of T.; "Anterior Spinal Instrumentation," Dewar Orthopaedic Club.

Dr. W. J. E. Spence, "Surgical Aspects of Crohn's Disease and Ulcerative Colitis," The Toronto-Buffalo-Rochester Radiological Society; "Lymphomas of the Small Bowel in Adults," Toronto Academy of Medicine; "Surgery—Then and Now," Queen's University.

Dr. G. A. Trusler, "The Mustard Operation and New Surgical Techniques," "Recent Developments in Cardiology," the Hospital for Sick Children, Toronto; "Ascending Aorta to Right Pulmonary Artery Shunt: Indications and Dangers," Royal College of Surgeons; "Palliative Procedures for Transposition of the Great Arteries," Buffalo Children's Hospital.

Dr. R. G. Vanderlinden, "Cauda Equina Compression Due to Protruded Lumbar Intervertebral Discs," Interurban Surgical Society.

Dr. N. A. Watters, "Carcinoma of the Bile Ducts," U. of T. General Surgical Course; "Surgery of the Stomach and Duodenum," U. of T. Graduate Lecture Course.

Dr. A. M. Wiley, "Deep Venous Thrombosis Following Hip Surgery," Canadian Orthopaedic Association Meeting; "Studies in the Transplantation of Hyaline Cartilage," Canadian Orthopaedic Association; "Venous Thrombosis Following Hip Fractures. The Effects of Anticoagulation," British Orthopaedic Association.

Dr. J. K. Y. Yao, "Heart Transplantation," Registered Nurses' Association of Ontario; "Status of Short and Long Term Survivors," Second World Symposium on Heart Transplantation.

Dr. W. Zingg, "Cold Injuries" (Visiting Professor) University of Basel, Switzerland; "Mathematics, Machines, Man, Medicine" (Visiting Professor) University of Berne, Switzerland.

PUBLICATIONS

Aldridge, H. E., MacGregor, D. C., Lansdown, E. L., and Bigelow, W. G. "Internal Mammary Artery Implantation for the Relief of Angina Pectoris: A Follow Up Study of 77 Patients for up to 13 Years" (*Canadian Medical Association Journal*, vol. 98, no. 4, Jan. 27, 1968, pp. 194–8).

Baird, R. J., and Manktelow, R. T. "A New Approach to the Measurement of Intramyocardial Pressures" (*Circulation*, Supplement 6, vol. 38, Oct. 1968, p. 133).

——— "The Pressure in a Vascular Implant in the Myocardium during Systole" (*ibid.*, vol. 38, Supplement 6, Oct. 1968, p. 36).

——— "The Systolic Pressure in the Tunnelled Portion of a Myocardial Vascular Implant" (*Journal of Thoracic and Cardiovascular Surgery*, vol. 56, no. 5, May 1969, pp. 714–22).

Baird, R. J., Manktelow, R. T., Cohoon, W. J., Williams, W. G., and Spratt, E. H. "Improved Pressure Gradients and Flow Rates in Myocardial Vascular Implants" (*Annals of Surgery*, vol. 168, no. 4, Oct. 1968, pp. 736–49).

Baird, R. J., Williams, W. G., Spratt, E. H., and Cohoon, W. J. "Experimental Homograft Replacement of the Mitral Valve" (*Canadian Journal of Surgery*, vol. 12, no. 1, Jan. 1969, pp. 144–54).

Baker, C. B., Campbell, H. H., Evans, J. G., and Mahoney, L. J. (with Halnagyi, A. F.) "Successful Replantation of a Completely Severed Arm followed by Re-amputation because of Failure of Innervation" (*Canadian Journal of Surgery*, vol. 12, no. 2, April 1969, pp. 222–8).

Bauer, W. E., King, J. A. C., Levene, R. A., and Drucker, W. R. "Metabolic and Physiological Consequences of a Single Acute Hemorrhage" (*Journal of Laboratory and Clinical Medicine*, vol. 72, no. 5, 1968, p. 854).

Bauer, W. E., Vigas, S. N. M., Haist, R. E., Levene, R. A., and Drucker, W. R. "Influence of Infused Glucose on Insulin Response during Hypovolemic Shock" (*Federation Proceedings*, vol. 28, no. 2, 1969, p. 507).

Bayliss, C. E., Beanlands, D. S., and Baird, R. J. "The Pacemaker-Twiddler's Syndrome: A New Complication of Implantable Transvenous Pacemakers" (*Canadian Medical Association Journal*, vol. 99, no. 8, Aug. 24–31, 1968, pp. 371–3).

Beanlands, D. S., and Baird, R. J. "Mechanical Support of the Circulation" (*Circulation*, vol. 37–8, Supplement 6, Oct. 1968, p. 40).

Bigelow, W. G. "Intellectual Humility in Medical Practice and Research" (*Surgery*, vol. 65, 1969, pp. 1–9).

Birch, J. R. *et al.* "Microvascular Events in Cheek Pouch Wounds of Oophorectomized Hamsters following Intra-muscular Injections of Female Sex Hormones" (*Journal of Periodontal Research*, vol. 3, 1968, pp. 12–20).

——— "Wound Healing in Estrogen Treated Female Rabbits" (*ibid.*, pp. 21–3).

Bobechko, W. P., and Kostuik, J. P. "Childhood Villonodular Synovitis" (*Canadian Journal of Surgery*, vol. 11, Oct. 1968, pp. 480–6).

Bobechko, W. P., McLaurin, C. A., and Motloch, W. M. "Toronto Orthosis for Legg-Perthes Disease" (*Artificial Limbs*, vol. 12, 1968, pp. 36–41).

Cook, G. T. "Appendiceal Abscess causing Urinary Obstruction" (*Journal of Urology*, vol. 101, Feb. 1969, pp. 212–15).

——— *Dead or Alive* (Proceedings of Continuing Course for Coroners). Ontario Attorney General's Office, 1968.

Crassweller, P. O. "Benign Hyperplasia of the Prostate" (*Canadian Nurse*, vol. 64, no. 12, Dec. 1968, pp. 32–4).

——— "The Use of Nitrogen Mustard for Prevention of Bladder Tumor Recurrence" (*Journal of Urology*, vol. 100, July 1968, pp. 21–3).

Delarue, N. C. "Le Cancer du poumon" (*Médicin de Famille Canadien*, vol. 14, no. 9, sept. 1968, pp. 105–9).

——— "Cancer of the Lung" (*Canadian Family Physician*, vol. 14, no. 9, Sept. 1968, pp. 56–62).

——— "La Cigarette: et ses effects sur la santé" (*Informations sur l'alcoolisme et les autres toxicomanies*, sept.–oct. 1968, pp. 4–12).

——— "La Cigarette – une habitude dont on peut se défaire" (*L'Infirmière Canadienne*, vol. 11, no. 3, March 1969, pp. 36–9).

——— "Health Hazards of Smoking" (*Modern Medicine of Canada*, vol. 23, no. 7, July 1968, pp. 37–42).

——— "Health Hazards of Smoking" (*Modern Medicine of Australia*, vol. 6, March 1969, pp. 19–38).

——— "Primary Breast Cancer: A Suggested Plan for Orderly Management" (*Canadian Family Physician*, vol. 15, no. 3, March 1969, pp. 29–32).

——— "Smoking – A Habit that *can* be broken" (*Canadian Nurse*, vol. 64, no. 12, Dec. 1968, pp. 28–31).

Dewar, F. P., and Evans, D. C. "Occult Fracture – Subluxation of the Midtarsal Joint" (*Journal of Bone and Joint Surgery*, vol. 50, May 1968, pp. 386–8).

Drucker, W. R. *et al.* "Histochemical Investigation of Hepatic Adenosine Triphosphatase and Glucose-6-phosphatase Activity in Hemorrhagic Shock" (*Proceedings of the Society of Experimental Biology and Medicine*, vol. 127, 1968, pp. 1090–4).

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——— "Experimental Epiphyseal Plate Injuries"; in *ibid.*, pp. 168–70.
——— "Hyperemia, Hypervascularity and Limb Overgrowth" (*Canadian Journal of Surgery*, vol. 12, Jan. 1969, pp. 136–43).
HASTINGS, D. E. "A Simple Frame for Operations on the Lumbar Spine" (*Canadian Journal of Surgery*, vol. 12, April 1969, pp. 251–3).
HASTINGS, D. E., and HOUPT, J. B. "Surgery in Rheumatoid Arthritis" (*Journal of the Canadian Physiotherapy Association*, vol. 20, no. 2, April 1968, pp. 116–19).
HASTINGS, D. E., MACNAB, I., and LAWSON, V. "Neoplasms of the Atlas and Axis" (*Canadian Journal of Surgery*, vol. 11, July 1968, pp. 290–6).
HEIMBECKER, R. O. "Surgery for Massive Myocardial Infarction" (*Progress in Cardiovascular Diseases*, vol. 11, Jan. 1969, pp. 338–50).
HEIMBECKER, R. O., ALDRIDGE, H., and LEMIRE, G. "The Durability and Fate of the Aortic Valve Grafts – An Experimental Study with a Long-term follow up of Clinical Patients" (*Journal of Cardiovascular Surgery*, Blalock Memorial Edition, vol. 9, Nov. 1968, pp. 511–17).
HEIMBECKER, R. O., and LEMIRE, G. "Surgery for Massive Myocardial Infarction: An Experimental Study of Emergency Infarctectomy, with a Preliminary Report on the Clinical Application" (*Circulation, Supplement*, vol. 37, April 1968, pp. 3–11).
HEIMBECKER, R. O., LEMIRE, G., CHEN, C. H., KOVEN, I., LEASK, D., and DRUCKER, W. R. "The Role of Gas Embolism in Decompression Sickness – A New Look at the 'Bends'" (*Surgery*, vol. 64, July 1968, pp. 264–72).
HENDRICK, E. B., and HARRIS, L. "Post-Traumatic Epilepsy in Children" (*Journal of Trauma*, vol. 8, no. 4, July 1968, pp. 547–56).
HENDRICK, E. B., HOFFMAN, H. J., and ENGLISH, T. "The Surgical Aspects of Treatment of Medulloblastoma" (*14th Annual Clinical Conference of the Ontario Cancer Treatment and Research Foundation*, pp. 71–9).
HOFFMAN, H. J. "Spina Bifida" (*Modern Medicine of Canada*, vol. 23, no. 6, 1968, p. 61).
KEON, W. J., and HEIMBECKER, R. O. "Massive Pulmonary Embolism: Modern Surgical Management" (*Canadian Journal of Surgery*, Dr R. Janes Memorial Edition, vol. 12, Jan. 1969, pp. 15–21).
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KEON, W. J., TRIMBLE, A. S., and BIGELOW, W. G. "Shock – A Practical Guide to Management" (*Modern Medicine*, vol. 23, special article, May 1968, pp. 49–52).
KEY, J. A. The Role of Perfusion Therapy in Malignant Melanoma" (*Canadian Medical Association Journal*, vol. 99, no. 1, July 6, 1968, pp. 11–12).
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KING, J. A. C., LEVENE, R., RECKNAGEL, F. O., and DRUCKER, W. R. "The Metabolic Effect of Hemorrhagic Shock on Pre-existing Respiratory Alkalosis" (*Surgical Forum*, vol. 14, 1968, pp. 40–2).
KLOTZ, P. G. "Effect of Hyperbaric Oxygen on Chronic Pyelonephritis in Rats" (*Investigative Urology*, vol. 6, no. 1, 1968, p. 1).
——— "Quizmanship, or The Instruction of the Examiner" (*The Oracle*, March 1969).
——— "Ureteral Reflux in Adults" (*Canadian Medical Association Journal*, vol. 100, no. 1, Jan. 4, 1969, pp. 4–12).
KOVEN, I. H., COTTON, R., and MATHEWS, R. "Fallibility of Extra Cellular Fluid (ECF) Measurements after Trauma" (*Clinical Research*, vol. 17, no. 2, April 1969, p. 436).
KOVEN, I. H., and GLADSTONE, R. "Hyponatremic Encephalopathy" (*Annals of the Royal College of Physicians and Surgeons of Canada*, vol. 1, no. 1, Jan. 1969, p. 74).
KOVEN, I. H., LEASK, D., SARSON, A., and POLLARD, A. "A Rapid Method of Determining Radioactive Sulphate ($S^{35}O_4$) in Plasma and Urine" (*Journal of Nuclear Medicine*, vol. 10, no. 6, June 1969, pp. 284–5).
KOVEN, I. H., PUDDEN, J., and LEASK, D. "Use of Balanced Salt Solutions in Major Operations" (*Annals of the Royal College of Physicians and Surgeons of Canada*, vol. 2, no. 1, Jan. 1969, p. 71).
LINDSAY, W. K. "The Epidemiology of Usual Facial Clefts in Ontario, Canada"; in *Craniofacial Anomalies: Pathogenesis and Repair*, ed. J. J. Longacre, pp. 101–4. Toronto: J. B. Lippincott, 1968.
——— "The Multidiscipline Approach to Treatment. An Editorial" (*Canadian Medical Association Journal*, vol. 99, no. 21, Nov. 30, 1968, pp. 1053–4).

LINDSAY, W. K. *et al.* "Cleft Palate Repair: Comparison of the Results of Two Surgical Techniques" (*Canadian Journal of Surgery*, vol. 12, Jan. 1969, pp. 32–9).

LIVINGSTON, K. E. "The Frontal Lobes Revisited – The Case for a Second Look" (*Archives of Neurology*, vol. 20, Jan. 1969, pp. 90–5).

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——— "Negative Laminectomy" (*El Médico*, ediciones profesionales, S. A. México, Feb. 1968).

——— "Pathogenesis of Symptoms in Discogenic Low Back Pain" (*American Academy of Orthopaedic Surgeons Symposium on the Spine*, Nov. 1968, pp. 97–110).

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——— "Tumours of the Cervical Spine" (*Canadian Journal of Surgery*, vol. 11, July 1968, pp. 290–6).

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MULLENS, J. E., and BIRD, G. S. "Peptic Ulceration of the Postbulbar Portion of the Duodenum" (*Canadian Journal of Surgery*, vol. 12, Jan. 1969, pp. 27–31).

MUSTARD, W. T. "Recent Experiences with Surgical Management of Transposition of the Great Arteries" (*Journal of Cardiovascular Surgery*, vol. 9, no. 6, Nov.–Dec. 1968, pp. 532–6).

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MUSTARD, W. T., and KEON, W. J. "Total Anomalous Pulmonary Venous Drainage. New Concepts in Management" (*Abstracts, 12th International Congress of Pediatrics*, Mexico City, Dec. 1–7, 1968).

PALMER, J. A. "Prolapse of the Rectum: Treatment by the Moschcowitz-Graham Operation" (*Canadian Journal of Surgery*, vol. 12, 1969, pp. 116–23).

PALMER, J. A., and MCPHEDRAN, N. T. "Athletic Injuries" (*Modern Medicine of Australia*, vol. 11, no. 24, pp. 19–27).

PEARSON, F. G. "An Evaluation of Mediastinoscopy in the Management of Presumably Operable Bronchial Carcinoma" (*Journal of Thoracic and Cardiovascular Surgery*, vol. 55, no. 5, May 1968, pp. 617–25).

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